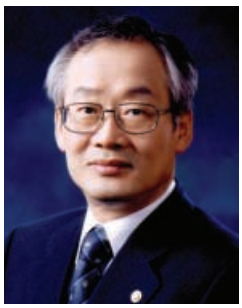
2003

Adapting Education to the Information Age

A WHITE PAPER

Ministry of Education & Human Resources Development
Korea Education & Research Information Service

Foreword



We have continuously implemented educational information projects with the long term vision and goal which was set forth in the Adapting ICT into Education Master Plan II 2001~2005 in pursue of educational reform and human resources development.

Furthermore, we have strived to improve the nation's world-class educational information infrastructure that was established in the process of implementing the Adapting ICT into Education Master Plan I 1997~2001. Based on such infrastructure, we also have made an utmost effort to improve the quality of education through fully utilizing ICT into National Curriculum in elementary and secondary school education.

Recognizing that universities are a primary source of innovation and creativity and play an pivotal role in enhancing a nation's international competitiveness in a knowledge information society, we have initiated the Comprehensive Plan “the e-Campus VISION 2007” which will lead to improvements in higher education through fostering and encouraging the use of ICT in university education and research.

Moreover, the creation of a Lifelong Learning Network which allows citizens to participate in various lifelong learning programs at anytime from any location will open up a new world of digital education in cyberspace.

The 2003 White Paper on Adapting Education to the Information Age will provide citizens with a better understanding of the accomplishments and projects in the area of using ICT in education in Korea. I wish it will become a valuable resource for many people who have an interest in the progress of adapting ICT into education in Korea.

I would like to express my gratitude to the senior advisory committee, contributors, reviewers, and editorial committee for their efforts in publishing the 2003 White Paper on Adapting Education to the Information Age.

November 27, 2003

Deok-hong Yoon
The Deputy Prime Minister
serving as the Minister of Education & Human Resources Development

Foreword

This is the fifth annual edition of the White Paper on Adapting Education to the Information Age. The Korea Education & Research Information Service (KERIS) has been a driving force in pushing through education reforms by promoting the use of ICT among elementary and secondary education and university research. This year we have witnessed Korea become the top nation in ICT infrastructure in a survey conducted by the World Economic Forum. The world-class ICT has been continuously adapted into education and research across the nation. These historic achievements are illustrated in the 2003 White Paper on Adapting Education to the Information Age, which provides a comprehensive overview of the rapid progress in Korea.

The educational information service, EDUNET, is also a world-class service that was made possible thanks to the solid support from the Ministry of Education & Human Resources Development, 16 Metropolitan and Provincial Offices of Education, and significant contributions from educators. The Research Information Service System (RISS) has become the leading public information system in the nation as all Korean universities subscribe to this service. The development of new educational content, new government policies, numerous ICT training courses for teachers, and significant support for improving classrooms has encouraged adapting ICT into teaching and learning processes. In addition, the government fully supports the stable operation of the National Education Information System (NEIS).

The 2003 White Paper on Adapting Education to the Information Age includes insights on the overall growth and development of the Korean education system and an overview of supporting policies and projects introducing ICT into education. These activities encompass education reforms across elementary and secondary schools, colleges and universities, and lifelong education. This white paper also includes various achievements made by KERIS with the support and cooperation from the Ministry, 16 Metropolitan and Provincial Offices of Education, teachers, and other agencies. This white paper will become a valuable source of information and provide a road map for future projects in expanding the use of ICT into education in Korea.

I sincerely thank all the writers, reviewers, editors, particularly senior advisory committee for their contributions in publishing the 2003 White Paper on Adapting Education to the Information Age.

November 27, 2003

Young-chan Kim 김 영 찬
Korea Education & Research Information Service
President

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2003

Adapting Education to the Information Age

Part 1. A General Summary

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Developing Human Resources that Will Lead the Knowledge-based Society

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Chapter 1
Developing Human Resources that Will Lead the Knowledge-based Society

1. Developing Human Resources that Will Lead the Knowledge-based Society

Unlike the agrarian and industrial societies of the past, today we have a knowledge-based society. In a knowledge-based society, advanced Information and Communications Technology (ICT) supports the exchange of information without time or location constraints. Because new information is created and dispersed quickly in this new era, the ability to use knowledge to increase productivity is a vital skill.

In order to adapt to the emerging knowledge-based society and to enhance national competitiveness, the people must learn new skills. To make the human resource development process more efficient, education should build on a person's natural skill and encourage people to look towards the future. A nation's future depends on how well it can prepare its human resources for the information age, and whether the potential of each individual in society can be reached.

A. A Basic Framework for National Human Resource Development

As a result of the socioeconomic changes that have occurred throughout the nation, the Korean government announced the Basic Framework for National Human Resource Development (2001). Its purpose is to put forth the nation's goal of attaining a level of national competitiveness on a par with developed nations through the development of highly-skilled workers.

The Basic Framework for National Human Resource Development includes national strategies and policy designed to facilitate human resource development in a knowledge-based society. This framework is a comprehensive government policy on knowledge and people, and it will set the direction for education, training, research, employment, industry, and other areas. It focuses on the following four policy areas: improving the basic abilities of citizens, developing individual development for personal growth, advancing the harness and management of national human resources, and building a

<Table 1> Basic Structure and Major Tasks of Basic Framework for National Human Resources Development

Improve the basic skills of all citizens	Develop human resources and information for growth	Advance harness and Management of national human resources	Build a national human resources infrastructure
-Provide a basic education for all citizens -Foster innovation among youth -Encourage lifelong learning -Support training courses for the disadvantaged -Teach citizens good values	-Nurture the gifted -Invest in human resources as a strategic initiative -Foster close cooperation among industries, universities, and research institutes -Develop human resources for the service industries -Nurture professional musicians and artists	-Enhance the professional skills of civil servants -Advance harness of human resources in the private sectors -Encourage to employ more women in the workforce	-Develop human resources database -Reform the system of distributing information -Reinforce human resource policies

Source: Ministry of Education & Human Resource Development (MOE & HRD), Background and Major Tasks of National Human Resources Policy, 2002

national human resources infrastructure (Table 1).

B. Human Resources Development in the Roh Moo-hyun Administration's Participatory Government

With the election of president Roh Moo-hyun, government policy regarding the development of national human resources has reached a major turning point.

One of the top 12 policy goals of the Roh administration is "Educational Reform and the creation of a Knowledge- and Culture-based Society," a policy that has been created to maximize the development of human resources in a knowledge-based society and to help Korea realize its full potential as a knowledge-based society. This policy also outlines the specific tasks that must be accomplished to develop human resources in a knowledge-based society.

The human resource development policy under the Roh administration is based on the nation's governing principles and seeks to maximize the skills of each individual by changing society and culture so that people can reach their full potential in developing their capabilities. In addition, in the execution of centralized policy, the Ministry of Education & Human Resources Development (MOE & HRD) should allocate resources to Municipal and Provincial Offices of Education, local offices of education, and schools efficiently, and in a way that promotes the autonomous development of each institution.

The success of the national policy for human resource development will narrow the gap between Korean society and the societies of developed nations, while helping the nation

achieve an average national income of 20,000 US dollars. This is one of the goals of the Roh administration. Accomplishing these goals will elevate Korea's standing in the international community.

2. Education Policy Direction for a Knowledge-based Society

A. Educational Reforms

In order to effectively develop human resources for a knowledge-based society, reforms must be carried out through the entire educational system. As natural resources are scarce in Korea, human resource development through education is an important part of the national agenda.

The educational reforms that will facilitate the development of a knowledge-based society include teaching students effective learning strategies that allow them to acquire knowledge. Students need to possess the ability to absorb new knowledge in an active way and learn how to link together disparate pieces of information to solve problems.

It is also important that creative thinking and problem-solving skills be developed by students. Students must develop the communication skills and enthusiasm for challenge that will allow them to handle changing situations, and find innovative solutions to problems. Students must also be able to succeed in an international environment. The importance of meeting the standards of international regulators like the World Trade Organization (WTO) means that a new generation of Koreans must have strong foreign language skills. This will allow them to respond to critical international issues that could have a major impact on Korea. Koreans need to keep abreast of international affairs and have in-depth knowledge of foreign cultures.

For Korean youth, it is important to foster a sense that they belong to a community. Young minds need to learn how to build consensus through healthy debate, respect for the opinions of others, tolerance, and cooperation, and it is the job of Korean education to teach these skills.

Finally, Korea must improve its support for education by emphasizing science education, moderating regulations that prevent the creation of an efficient and effective education system, and eradicating elitism and favoritism among university graduates. New policy frameworks and continuous improvements to the current laws and regulations are necessary to overhaul the education system. To achieve a sophisticated knowledge-based society, it is essential to create an educational information infrastructure and a cyber education system.

B. Education System Reform in the Roh Moo-hyun Administration's Participatory Government

After Roh Moo-hyun became president in 2003,

the Roh administration made “Educational Reform and the creation of a Knowledge- and Culture-based Society” one of its top 12 policy goals. The main objective of this policy is to implement systematic reform in the education system so that tangible benefits will reach citizens.

A few of the specific goals targeted in this policy include the creation of an education community that allows participation and autonomy, bringing substantial improvements to public education, expanding educational opportunities for citizens, and improving the level of science education.

Chapter 2
Goals and the Current Status of Adapting ICT into Education

1. Overview

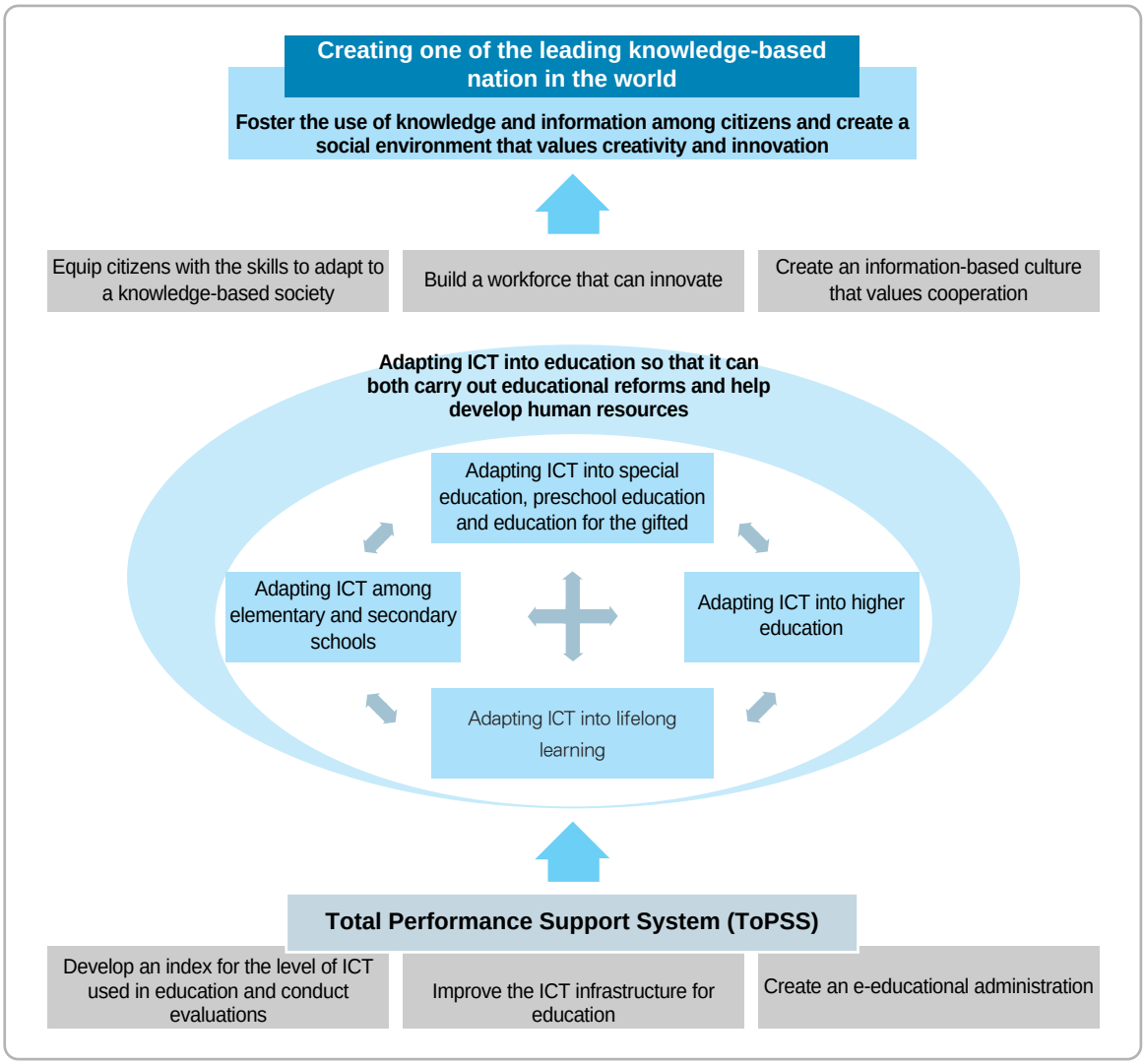
Maintaining an international competitive advantage in a knowledge-based society requires creative individuals who can create and share knowledge with a wide spectrum of the population. The Korean government is taking a systematic and comprehensive approach to improve the education system and developing human resources through the use of ICT. In pursuing this goal of using ICT in education, the Roh administration seeks to create a leading knowledge-based society that will help Korea maintain its international competitiveness and contribute to the international community.

Adapting ICT into Education Master Plan was completed two years ahead of schedule in 2000. Following the early completion of the plan, Adaption ICT into Education Master Plan Ⅱ was formulated with an emphasis on educational reforms and the development of human resources. This plan will be carried out between 2001 and 2005. Adapting ICT into Education Master Plan hopes to equip citizens with the necessary skills for success in a knowledge-based society, foster creative thinking among skilled workers, contribute to the creation of an information-based culture, and build a merit-based system that will reward strong performers (Figure 1).

Adapting ICT into Education Master Plan is based on the following strategies.

The first strategy is to distinguish the distinct roles that the MOE & HRD, education-related governments bureaus, local goverments, educational agencies, and the private sector will play in efficiently channeling the nation's resources towards a single common goal. The second strategy involves the introduction of a flexible policy which promotes the use of ICT in education while responding to the rapid changes in ICT. The third strategy requires bridging the digital divide through education and training and, in turn, developing a more sophisticated information-based culture. The fourth strategy requires that the infrastructure is designed and built for better outcomes.

<Figure 1> Vision for Adapting ICT into Education



2. Progress and Goals for Introducing ICT in Education

A. The Use of ICT in Elementary and Secondary Schools

The use of ICT in elementary and secondary schools will be carried out according to Adapting ICT into Education Master Plan and the Promotion Plan for using ICT in Schools. Revisions will be made to the plan after student performance results are analyzed in order to fine-tune the desired outcome.

The following four goals are identified to realize

this vision.

First, support-primarily government-subsidized PCs and Internet access in the classroom-will be given to teachers to enhance their ability to use ICT. Additional support that includes the provision of course materials and free educational content will help complete the creation of the educational infrastructure necessary to facilitate the use of ICT.

Second, a support system for teachers and course curriculum in every subject will be put in place. In addition, a system for distance learning in every school subject will be made available to remote village schools. The creation of this support system will enhance the quality of education and the effectiveness of teachers.

Third, a system which allows special classes for slower learners and independent study for all students will be created. Thus, support will be extended to students while they study at home.

Fourth, educational specialists will conduct extensive research into the most effective ways of teaching the use of ICT. Further, these methods will be flexible enough to respond to the changing nature of ICT.

To achieve the vision of introducing ICT in elementary and secondary schools by achieving the above goals, four principles must be followed.

First, the role that each involved agency plays must be distinct in order to prevent overlap while ensuring the efficient distribution of responsibilities The MOE & HRD will coordinate and lead all the projects, while the Municipal and Provincial Offices of Education will establish action plans at local level and allocate funds. The Municipal and Provincial Offices of Education in charge of the projects will attempt to achieve the project goals in accordance with local action plans. The Korea Education & Research Information Service (KERIS), which is responsible for introducing ICT into education, will continue to carry out research in related fields and complete projects that will create the underlying infrastructure for promoting the use of ICT in education.

Second, the focus of promoting ICT will shift from creating the necessary infrastructure towards improving methods of teaching ICT use. In order to achieve this, support for ICT training will be extended to teachers so that they can improve their ability to use ICT. Teaching methods that incorporate ICT will be developed and researched, and funding for school scholarships will be provided.

Third, flexible policies that are compatible with the constant changes in ICT need to be set in place. This allows the improvement of “innovation” projects led by Municipal and Provincial Offices of Education while creating a sophisticated information-based culture. Additionally, project results must be evaluated and the “feedback” system needs to be improved. Regulations and laws concerning the securing of funds will also need to be revised.

Fourth, a cooperative system must be built to foster a healthy cyber-culture and minimize the drawbacks involved in implementing ICT.

To realize the use of ICT in elementary and

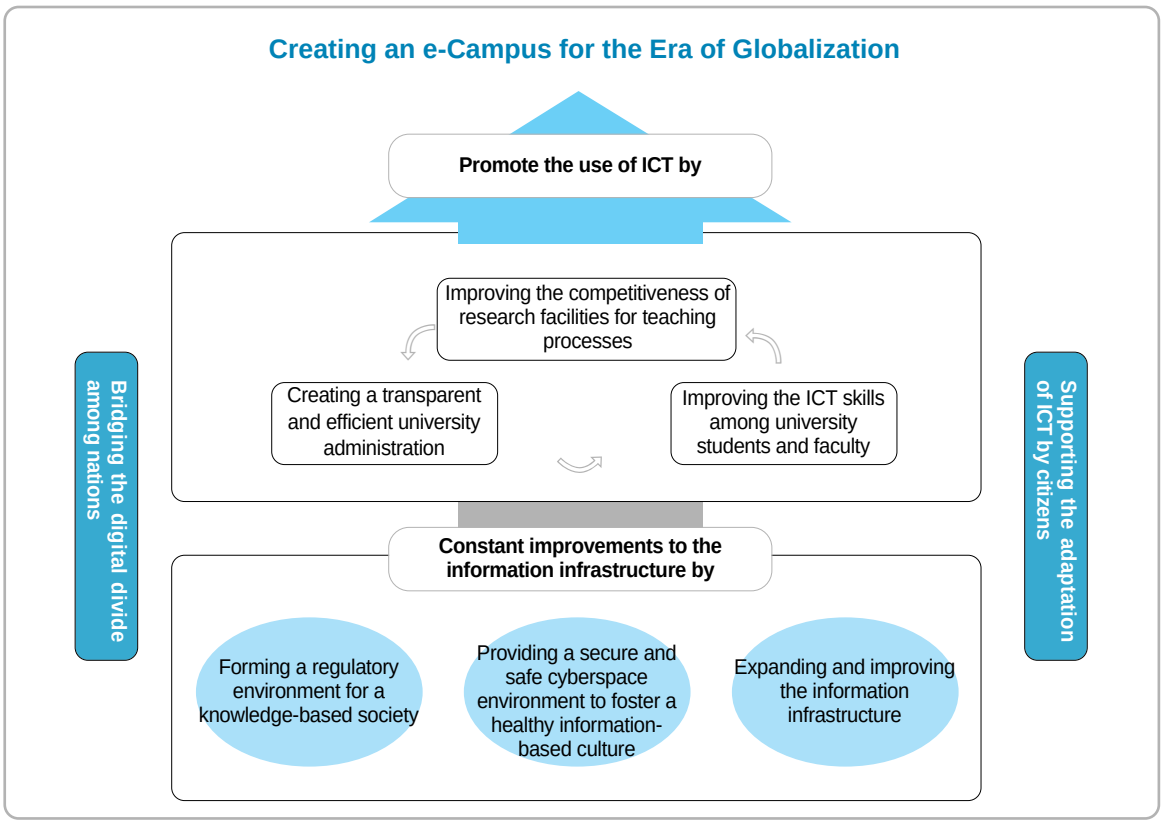
secondary schools, methods for using ICT must be developed, educational information must be produced and distributed, a support system for online teaching needs to be created, an educational environment that can accommodate ICT is required and support for promoting ICT in education is necessary.

B. The use of ICT in Universities and Research Institutes

In December 2002, universities began implementation of e-Campus VISION 2007 (2003~2007) in order to graduate highly skilled workers who can lead the nation in the 21st century (Figure 2).

The goals of e-Campus VISION 2007 include creating a knowledge-based community that encourages innovative thinkers, implementing

<Figure 2> e-Campus VISION 2007 (2003~2007)



Source: MOE & HRD, e-Campus VISION 2007 (2003~2007)

reforms to administrative services and the revision of various laws that regulate universities in order to elevate Korean universities to the level of world-class institutions through a strong ICT infrastructure. Colleges also need to expand academic research and enhance the quality of college education so that they can play a vital role in developing human resources for a knowledge-based society. Furthermore, the international competitiveness of Korean universities needs to be enhanced so that universities can adapt to the rapid social and economic changes that come with globalization.

In order to achieve these goals, colleges must expand the use of ICT in education by creating a strong infrastructure for e-Learning and increasing collaboration with other institutions in terms of sharing academic research. In addition, launching a next-generation university administrative information system (ERP: Enterprise Resource Planning), and creating a healthy cyber culture are initiatives that will also support the goals of the e-Campus Vision 2007.

Meanwhile, five main initiatives will be implemented over beginning in 2003 and continuing over the next 5 years.

The first initiative requires the creation of a college e-Learning support center. Full-time and part-time college students will be able to take online courses in the location and at the time of their choosing. Various academic and course materials will be made available to students, and supportive measures, which allow students to independently choose their courses and areas of research will be installed.

The second initiative is to expand the sharing of academic research information. KERIS will take a leading role in implementing this initiative, which entails collecting disparate academic information into a single network. Original academic research papers will be saved in a digital format to make high quality academic research more freely available.

Implementing a next-generation university administrative information system, Enterprise Resource Planning(ERP), deployed across colleges, is the third initiative. This project will gradually reform college administrative processes through the use of ICT and will support the efficient management of universities. The deployment of an ERP solution will streamline administrative tasks and allow universities to offer a wider range of services. It will also support research and academic activities.

The fourth initiative involves enhancing the current system for introducing ICT into colleges. The government will urge colleges to adopt a chief information officer (CIO) system where professional ICT specialists will manage and supervise the ICT infrastructure in colleges. Eventually, CIOs from different colleges will communicate with one another on ICT issues. In 2003, a “College ICT Council” (tentative name) will be formed to merge college ICT-related councils with the community of college CIOs.

The fifth initiative is the creation of a healthy

cyber culture. A safe and reliable ICT infrastructure in colleges will be created which supports a healthy and sophisticated information-based culture.

C. The Use of ICT in Lifelong Learning

The use of ICT in lifelong learning requires the building of a lifelong learning information infrastructure that can link together different lifelong learning institutes and lifelong learning groups vertically and horizontally. Eventually, these linkages will provide lifelong learning-related information to anyone at anytime from any location in a one-stop service. A support system for the illiterate, senior citizens, the disadvantaged, the deaf, and the blind is needed. National human resources need to be developed through creating lifelong learning curricula that provide all citizens with a basic education.

In the Lifelong Learning Act announced in March 2000, the Minister of the MOE & HRD declared that the National Center for Lifelong Learning will be responsible for carrying out research on lifelong learning, collecting information related to lifelong learning, and providing training to lifelong learning instructors and administrators. Under the law, the government and local self-governing bodies will connect schools, private institutions and private firms while developing lifelong learning courses that utilize ICT and introducing ICT into education. To carry out these mandates, the National Center for Lifelong Education - which was established within the Korean Educational Development Institute (KEDI) - has launched the lifelong learning information project.

The initiative to introduce ICT into lifelong learning began in 2000, and efforts have been channeled into creating a lifelong learning website, a database of lifelong learning teachers and instructors, and a lifelong learning program database. The lifelong learning comprehensive information system enables the efficient and systematic collection of information related to lifelong learning while disseminating and managing the collected data. In the long term, this system will allow the sharing of information between lifelong learning institutions. In addition, this system will provide online training, electronic lifelong learning resources, and online communities for the sole purpose of sharing educational information. These services are vital for disseminating various lifelong learning information efficiently.

The cyber education operation system, lifelong learning content development, and lifelong learning comprehensive information system and database were created to realize the goals of the lifelong learning initiative.

D. The Use of ICT into Educational Administration

Effective use of ICT in the educational administration is the underlying foundation for a

strong 21st century knowledge-based society. Some of the specific initiatives include the development of an advanced educational administration online system for teachers, the creation of an education statistical data system, implementing education-related policies, and introducing education-related administrative tasks for the MOE & HRD that support Korean government.

The NEIS is a system that facilitates many kinds of education-related administrative duties carried out in schools and education-related agencies by linking together the MOE & HRD, Offices of Education, elementary and secondary schools, and other education-related administrations and agencies. The NEIS was created to reduce the administrative duties of teachers by streamlining their responsibilities, provide parents with their childrens' academic performance reports, improve satisfaction with government services by improving services, and process education-related administrative duties efficiently and transparently.

As part of the NEIS project, the necessary hardware and software were installed in the MOE & HRD and 16 Municipal and Provincial Offices of Education. Elementary and secondary schools have been linked to education-related administrations via the Internet to allow the sharing of information. In the future, NEIS will offer compatibility with other systems created through e-Government initiatives and allow the sharing of more information. Through interconnected links across divisions and bureaus, administrative information can be shared making administration more efficient. The amount of paperwork that citizens are required to submit will be reduced for the convenience of the public.

The education statistical data project can be divided into five categories: managing the education statistical database, data analysis project, program development project, international education statistics initiative and surveying the approximately 20,000 educational institutions.

Chapter 3
The Outcomes of Adapting ICT in Education

1. Laws and Regulations Related to Introducing ICT into Education

The use of ICT in schools will be consistent with the regulatory structure governing ICT in education. Article 23 of the Basic Law of Education states that the government and local self-governing bodies will foster educational information projects and support the use of ICT in education. In addition, policies related to introducing ICT into education will be formed and executed by the government.

On the other hand, if education is broadly defined to also include lifelong learning (Lifelong Learning Act), then the laws related to using ICT in education will also have legislative power for lifelong learning. As stated in Article 15 of the Lifelong Learning Act, the government and local self-governing bodies must actively pursue the development of lifelong learning courses that include the use of ICT in education and network schools, private institutions, and private companies.

Thus, the laws that govern the use of ICT in education also have the jurisdiction to introduce ICT into lifelong learning institutions. According to these laws, the organizations that oversee education have the responsibility to facilitate the use of ICT in education. Any negative effects stemming from the use of ICT will be regulated by a separate category of regulations.

As of 2002, the laws related to the use of ICT in education are described in Table 2.

2. Development of an Index on Using ICT in Education

The Ministry of Education's establishment of the 'Action Plan for Promoting the use of ICT in Education' in 1996 introduced policies for the use of ICT in education. These initial policies lead to the creation of an ideal environment for Korea's emerging information-based society and created an information infrastructure for schools. The action plan is still supported by the government and continues to promote the adaptation of ICT in

<Table 2> Laws Related to Introducing ICT into Education

Name of Law	Articles	Main Description
Education Basic Act	Article 23	The government and local self-governing bodies support education centered on ICT training and ICT and foster the educational information industry. Necessary policies for introducing ICT into education will be drafted and implemented.
	Section 2 of Article 23	The necessary policies that allow schools and education-related administrations to carry out administrative tasks electronically must be established.
Lifelong Learning Act	Article15	Government and local self-governing bodies must develop lifelong learning courses based on ICT and introduce ICT into education in schools, private institutions and companies
	Article 22	This article establishes cyber university that allow anyone to receive an education through electronic distance learning. Lifelong learning is also supported in this law.
	Article 28	Recognizes that credits earned by completing courses at distance learning colleges and lifelong learning facilities will count towards attaining a degree.
Framework Act on Informatization Promotion	Article 5	A clause regarding the use of ICT in education will be added to the Framework Act on Informatization Promotion.
	Article 11	Fosters the adaptation of ICT in education and the public sector
	Article 33	Establishment and operation of the Informatization Promotion Fund
Promotion Act on Vocational Training	Article 15	- Vocational training institutes must build an efficient distance learning-enabled vocational training system that is based on advanced ICT. - Vocational training institutes must develop multimedia course material and use them in classes.
Regulation on Training for Teachers	Article 2	Distance learning institutions are recognized as training institutions
Regulation on Training for Teachers Enforced Law	Article 3	The law regarding the facilities, network, database, software, and equipment that is necessary for building a distance learning institute.
	Article 7	The minister of MOE & HRD will decide on the appropriate training course and explain this through televised broadcasts and communications.
Regional Education Financial Grant Act	Article 6	Law which allow for project funds for introducing ICT into education.
Reorganization of MOE & HRD and related agencies	Article 15	Strengthens the organizational structure of bureaus in charge of introducing ICT into education. Installs an international education bureau.
Action plan for reorganization of MOE & HRD and related agencies	Article 9	The international education bureau will have separate divisions for the support and planning of ICT adaptation in education, as well as an international education cooperation division.

<Table 2> Laws related to Introducing ICT into Education (´Continuation)

Name of Law	Articles	Main Description
The Act of Korea Education & Research Information Service	Article 1 Article 6	Information needed for education and research will be created, analyzed, collected, and distributed. KERIS is established to perform such roles.
Knowledge Resources Management Act	Article 1	Management and use of knowledge and information resources.
Laws related to using electronic method to complete administrative tasks for the creation of an e-Government	Article 2 Article 3 Article 4 Article 5 Article 6	-Building and operating an e-Government -Introducing electronic means of accomplishing administrative tasks -Government services based on electronic methods -Reduce the amount of paperwork -Launch e-educational administration
Laws related to bridging the Digital Divide	Article 4 Article 11	-Establish comprehensive plan for bridging the digital divide -Conduct ICT training

education.

The number of participants in the project for using ICT in education increases, along with the budget outlay required to keep the program running. Thus, there is a need to objectively evaluate the results in terms of the use of ICT in education, both by Korean standards, and in comparison with other nations. By developing an index for measuring the effective adaptation of ICT in education, Korea can more explicitly measure its progress.

The project for developing an index for using ICT in education is one of the 10 top initiatives outlined in the second phase of the MOE & HRD's Adaption ICT into Education Master Plan. The index which measures the level of ICT in education will be developed for elementary and secondary education in 2001 while an index for higher education will be completed in 2002. An index for lifelong learning is under development and should be completed by 2003. There is a plan to develop an index for special education in 2004. An existing index, the Domestic Index, was based upon indices developed by international organizations and provides a comparative measure of the level of ICT used in education between nations. This index provides an important example which guides future policy surrounding the introduction of ICT into education and helps identify which projects require the highest priority.

The index for measuring the level of ICT used in elementary and secondary education and other measurement tools which help analyze the level of ICT used in schools allows administrators to manage the effectiveness of ICT. Its establishment in 2001 has helped guide policy direction in terms of using ICT.

Through major revisions to the index in 2002, the index for using ICT in elementary and secondary education was completed and includes 3 major areas, 7 sub-categories, and 41 indices. In addition, an online self-evaluation system based on

the index functions was developed for measuring the level of ICT used in elementary and secondary education. Sixteen Municipal and Provincial Offices of Education across the nation are currently using this online system (Table 3).

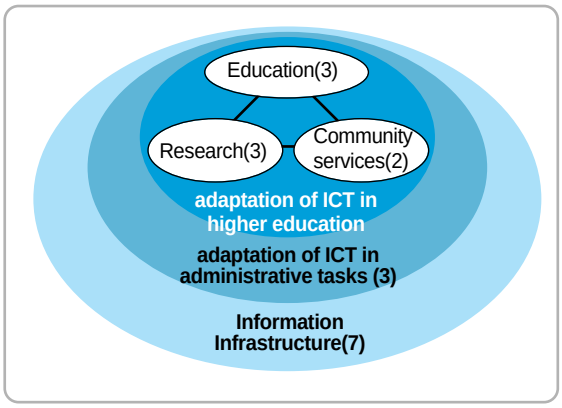
The Basic Framework for an Index of ICT use in Higher Education was developed in 2002, and is composed of 18 indices and 28 subcategory indices which allow the evaluation of the three areas that involve education, research, and volunteer work in higher education, and five other areas which include college administration and an infrastructure that supports academics (Figure 3). The indices are modified according to the type of institution that they will be applied to - regular universities, colleges of education, universities of industry, two-year colleges and other higher education institutions.

<Table 3> Index for Using ICT in Elementary and Secondary Education

Area	Sub-categories
Input	Support, hardware, and software
Utilization	Teachers, students, Internet
Outcomes	Teachers, students

Source: MOE & HRD, KERIS (2001), Research and development of Index for ICT adaptation in elementary and secondary education

<Figure 3> Index Areas of ICT Adaptation in Higher Education



Note:The number of indices is in parentheses
Source: MOE & HRD, KERIS (2002), Research and development of Index for ICT adaptation in higher education

3. Government Support for Outstanding Municipal and Provincial Offices of Education

A. Comprehensive Evaluation of Municipal and Provincial Offices of Education and the Level of ICT Used in Education

After a local self-governing system was introduced, a comprehensive evaluation of Municipal and Provincial Offices of Education was launched in 1996 to make Municipal and Provincial Offices of Education accountable for their decisions and promote competition between offices of education. These evaluations were held annually until 1999, when it was recommended that evaluations should be held every two years because annual evaluations were overstretching the resources of offices of education across the nation. Since 2000, evaluations have been conducted every two years.

To maintain the fairness, transparency, and objectivity of the evaluation process for each of

the Municipal and Provincial Offices of Education, members of the evaluation committee were drawn from a pool of leaders from education-related NGOs and specialists in the field of education. The evaluation criteria and checklist were released to the offices of education beforehand, and a standard evaluation checklist was used to standardize the evaluation process.

As the initiative to introduce ICT into education is becoming a focal point of national policy, the number of education-related projects has increased to the point where support for outstanding Municipal and Provincial Offices of Education is necessary and the level of ICT used in education has become very sophisticated. Since 2001, the MOE & HRD has extended its full support to projects using ICT in education which also respect the local characteristics of each region.

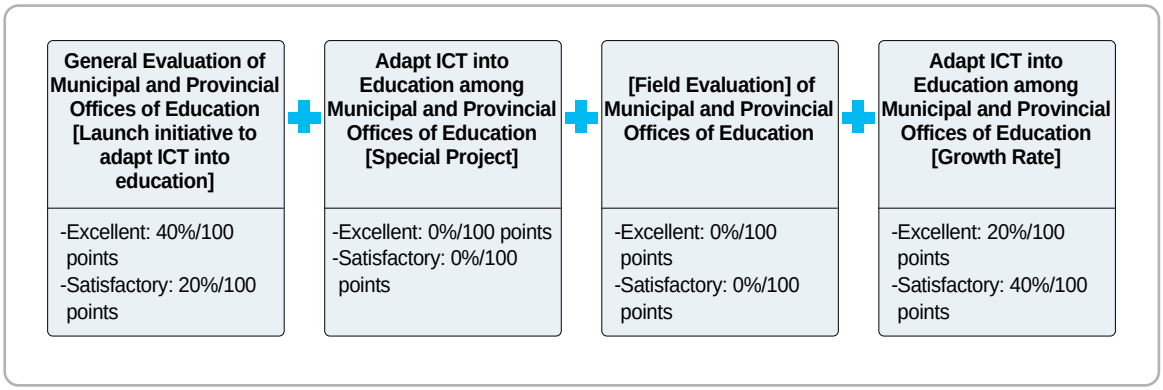
The main objective in evaluating the level of ICT used in Municipal and Provincial Offices of Education is to foster healthy competition among them which will, in turn, increase the level of ICT used in education. By introducing ICT into education across Municipal and Provincial Offices of Education and sharing exemplary cases of technology being used in education, the digital divide will be reduced. Policies for using ICT in education will be established under consultation with educators in the field who participate in the project for using ICT in education (Figure 4).

In particular, plans have included the incorporation of evaluation results from each Municipal and Provincial Offices of Education into government projects and policies from the same year. The government will carry out more general projects that are relevant to using ICT when evaluations are not conducted. Municipal and Provincial Offices of Education should also acknowledge the importance of national policies and the cooperation between offices of education should be evaluated. Also, projects that are customized according to the local characteristics of each Municipal and Provincial Offices of Education must be developed and evaluated. Evaluations should be focused more on the level of ICT adaptation rather than the physical ICT infrastructure. Municipal and Provincial Offices of Education that have relatively small budgets should be awarded government assistance to help reduce the digital divide between cities. As well, the evaluation criteria for Municipal and Provincial Offices of Education should focus on how effectively ICT has been introduced into education. This will minimize the confusion and burden on the Municipal and Provincial Offices of Education that are being evaluated. A more critical evaluation of the extent to which each Municipal and Provincial Offices of Education has achieved policy goals needs to be developed.

B. Evaluation Results

Municipal and Provincial Offices of Education that have successfully adapted ICT into education

<Figure 4> Basic System for Evaluating the Level of ICT Adapted by Municipal and Provincial Offices of Education



can be identified by analyzing the evaluation results of each office of education. Identifying successful techniques and methods used at one office of education allows them to be transplanted to other offices of education. This will be coordinated by offering consulting services to Municipal and Provincial Offices of Education that require assistance. Any feedback from the offices of education concerning their evaluation will be considered.

The purpose of evaluations is twofold: first, to make the Municipal and Provincial Offices of Education accountable for their progress in implementing ICT in education; and second, to facilitate the spread of techniques used by offices of education and schools that have successfully introduced ICT. By releasing the evaluation results and recommendations of the panel of judges to the public, policies on ICT in education can be formed in concert with the local needs of each city and province. Successful techniques and methods will be applied to other schools and disparities in the level of ICT used in education from region to region will be reduced. In the future, Municipal and Provincial Offices of Education that perform relatively worse than their counterparts will be identified and analyzed. Financial support and consulting services will be extended to underperforming offices of education to encourage a balanced growth in the national initiative to introduce ICT into education.

2003

Adapting Education to the Information Age

Part 2. Adapting ICT into Elementary and Secondary Education

Chapter 1
Advance the Educational Information Infrastructure

Chapter 2
Development and Distribution of Educational Information for Elementary and Secondary Schools

Chapter 3
Support for Adapting ICT into Elementary and Secondary Schools

Chapter 4
Teacher Training for Introducing ICT into Elementary and Secondary Schools

Chapter 5
The Use of ICT in Special Education and Educational Programs for the Gifted

Chapter 1
Advance the Educational Information Infrastructure

1. Building and Operating the ICT Infrastructure of Elementary and Secondary Schools

A. Progress

The Physical Infrastructure Construction Project for Introducing ICT in Education was launched in 1997 and has created a strong base that allows the educational system to expand the use of basic ICT among citizens. The "3-Year Plan for Constructing the Infrastructure for Adaptation ICT into Elementary and Secondary Education Master Plan" (1997~1999) led to the development of the "ICT into Elementary and Secondary Education" (1998~2002) in 1998. In 1999, the Master Plan was revised and re-launched as the "5-Year Plan for the Development of Human Resources through Education" (1999~2003).

The Adaption ICT into Education Master Plan Ⅰ began in 1997, and the immediate goal was to provide the Internet access and PCs for elementary and secondary school students. This phase of the plan was completed in 2000, two years ahead of schedule. Korea was the first nation in the world to build a school network linking all of the country's approximately 10,000 elementary and secondary schools together via the Internet. Approximately 13,000 computer labs were installed in the nation's schools.

After the underlying ICT infrastructure was completed, the second phase of Adapting ICT into Education Master Plan was launched, creating an environment that provided one PC per five students in every school, PC labs, dedicated classes for specific subjects, and smaller classes. The government also supported increasing Internet connection speeds at elementary and secondary schools to over 2Mbps and constructed a complete information environment to maximize the adaptation of ICT in the 7th National Curriculum.

The education information infrastructure in each city and province are managed and operated independently by civic and provincial administration. The central government sets technical standards when the need arises. The construction of the educational information infrastructure was funded by the ICT grant for

education that was drawn from regional education financial grants. Allocations from the national budget and matching funds will be used as the project grows nationally (Table 4).

B. Future Directions

First, improving the information infrastructure requires careful deployment of educational policy during the time of infrastructure development.

Second, due to the changing ICT environment and active use of ICT in education, large multimedia files are more common. Thus, adequate Internet connection speeds must be provided for each school and classroom and system errors and usage patterns must be effectively monitored.

Third, since the cost of maintaining and upgrading PC equipment is very high, there is a need to lower the price of equipment while introducing a PC upgrade policy that addresses these high costs.

Fourth, teachers in charge of the information infrastructure should be assisted by a reduction in administrative obligations. Alternatively, professional ICT specialists can be hired by schools to efficiently manage the information infrastructure. To institutionalize these measures, the maintenance and repair policy for educational information infrastructure should include provisions for assisting teachers given the responsibility of maintaining the network.

Fifth, the educational information infrastructure should be analyzed and evaluated regularly. In light of new findings, policies should be revised to incorporate suggestions that will improve the network.

2. Building Security into Educational Information

An educational information system requires an "ICT security system" in order to protect the data stored in PCs, the LAN, and the educational information system itself from all internal and

<Table 4> Infrastructure Contruction Project for Adapting ICT in Elementary and Secondary Schools

Activity	Service	Agency in charge
ICT-friendly Educational Environment	-Install PCs for school labs -PC upgrades (Computer lab PCs, one PC per teacher ICT-supporting classrooms) -Upgrade the Internet connection speeds	Municipal and Provincial Offices of Education
Building Integrated Management System for Information Infrastructure	-Maintain and repair information devices (computer lab PCs, one PC per teacher, ICT-supporting classrooms) -Maintain and repair school network	Municipal and Provincial Offices of Education

Source: MOE & HRD, 2003 Promotion Plan for adapting ICT in Education, 2002

external attacks. This security system is comprised of a combination of techniques and methods for thwarting attacks on the educational information system and eliminating network vulnerabilities.

The completion of the network for elementary and secondary schools across the country in early 2000 increased the number of classes adapting ICT via the Internet, ICT administrative duties, e-mail, and the general exchange of information. In the midst of the rapid adaptation of the Internet, elementary and secondary schools and colleges have suffered damages due to hacking attacks and viruses. There have been many cases where attacks were routed through a compromised school network and from there unleashed to mount a large-scale attack against other systems. Thus, security weaknesses in school information systems must be addressed and eliminated and administrators must be aware of security issues.

In 2002, there were three main types of security vulnerabilities found in colleges and elementary and secondary schools. The first type is a denial of service attack that sends a flood of requests to the system over the network. The second kind is a malicious e-mail attachment often containing a worm virus that can spread through the network and create havoc. The Sircam virus is usually disguised as an e-mail attachment and can extract information from data stored in the network or PC. The third most common vulnerability found in school networks is a compromised school server that passes on unsolicited e-mail from a spam mail sender to people's e-mail accounts around the world. As hacking attacks and deluges of unsolicited e-mail can bring down an entire nation's network, security problems are becoming more widespread in school networks.

The MOE & HRD has revised the basic security guidelines regarding ICT formulated by the former Ministry of Education in September 2000, and ordered the Municipal and Provincial Offices of Education and relevant agencies to adopt these new guidelines. However, awareness of ICT security issues and the creation of a physical security system are essential.

Chapter 2
Development and Distribution of Educational Information for Elementary and Secondary Schools

1. Development and Distribution of Educational Information

A. Overview

Beginning in 1980, educational information for education(content for teaching and learning) elementary and secondary school in Korea have been developed. In the 1990s and 2000s, National curriculums were revised, ICT was adapted, and the classroom environment began to change, and a wide variety of ducational materials were developed (Table 5).

The 7th National Curriculum was introduced in

<Table 5> Development and Changes in Educational Information

	Hardware Environment	Developer of resources	Subjects	Resources
1980s	8-bit, 16-bit Monochrome monitor	Jointly developed by Municipal and Provincial Offices of Education KEDI	Math, Science, and other subjects	Individual leaner centered (CAI)
Early 1990s	386 Color monitor	Jointly developed by Municipal and Provincial Offices of Education KEDI	Major subjects	Individual leaner centered (CAI)
Mid 1990s	486 online PC service	Developed independently or jointly by Municipal and Provincial Offices of Education KEDI	All subjects	Individual leaner centered (CAI)
Late 1990s	586 Internet Devices compatible for ICT-supporting classrooms	Developed independently by Municipal and Provincial Offices of Education Korea Multimedia Education Center	All subjects	Individual leaner centered (CAI,WBI) Teaching materials
Early 2000s	More powerful PCs and faster Internet connection speeds Rapid diffusion of PCs in households	Developed independently or jointly by Municipal and Provincial Offices of Education KERIS	All subjects	Teacher-oriented tools (Multimedia resources, ICT-based teaching processes, Teacher software)

Source: KERIS, May 2003

2000 and new teaching materials for each subject and grade needed to be developed. The MOE & HRD, Municipal and Provincial Offices of Education, and KERIS jointly developed teaching-learning materials for 10 grades and 10 subjects.

Multimedia educational resources, including sound and video clips, instructional material, courses on how to use ICT in the teaching, ICT-based teaching software, National educational software contest and various other educational software developed by private companies have been continuously developed, shared and distributed.

B. Current Status and Future Directions

The educational resources required for teaching students should be divided into required basic subjects and elective subjects, and developed separately. The basic subjects must be developed as a first priority because they will be taught to all elementary and secondary school students.

From 2000 until 2002, more than 6,917 sets of teaching plan material were developed. A total of 3,130 kinds of material were developed by public sector, and of these, 124 were multimedia educational resources, 163 were multimedia teaching plan materials, 2,133 were ICT materials for teachers, and 710 were ICT learning materials. Private software developers created 3,787 separate educational resources. The contributions from the private sector are nearly equal to the contributions from the public sector. A wide range of projects are in progress to distribute and use these educational materials. Among these projects are Internet broadcast stations operated by Municipal and Provincial Offices of Education that offer Internet distance learning courses and also develop multimedia material.

In order to allow quick and convenient access to content, an educational information sharing system has been built and deployed. This system links16 Municipal and Provincial Offices of Education with EDUNET and provides on-demand content. In the future, the system will be expanded to include links to schools and public agencies. As of 2003, there are 15,000 kinds of educational resources available to users.

To develop a variety of practical educational materials, a national education software competition was held and an ICT skill training program was also organized.

Educational resources that incorporate ICT will contribute to the education system by improving public education in elementary and secondary schools and reducing the need for private tutoring among students in Korea.

2. Educational Information Developed and Distributed by the Private Sector

The widespread use of multimedia PCs and CD-ROMs laid the foundation necessary for

educational content businesses to prosper in 1992. Rapid market growth made this a promising industry, but due to the Asian financial crisis, many software developers either exited the market or went bankrupt. Additionally, in 1997, the widespread use of the Internet hurt the CD-ROM business.

In 1998, the MOE & HRD and Municipal and Provincial Offices of Education launched the "Software Development and Distribution by the Private Sector Project" to foster the private development of educational software for use in schools. Ten billion won were allocated to fund this project. This project created an enormous opportunity for software developers suffering from the economic downturn. Many of the educational software programs that were developed at this time were software programs tailored for classrooms rather than general learning software or edutainment programs.

An exhibition for using ICT in education called EDUEXPO was started in 1998 to unite educational software developers with school administrators so that developers could promote and distribute their software products. This exhibition is held in several cities every year. Since 2002, a special theme appropriate to the current state of ICT is selected for the exhibition and a main pavilion is designed to fit this theme. In 2003, visitors could experience a theme pavilion that showcased a futuristic school library and classroom.

In order to improve the quality of educational software and promote the sales of outstanding educational software products, a system for certifying the quality of software products was launched in 1998. By meeting certain requirements, about 100 software products received a certified seal of approval. Developers and distributors label their software products with these certified seals to promote their software. Since 2003, a certificate of quality seal for educational content offered via the Internet has also been introduced. As of 2002, 563 software products have received a certified quality seal.

3. EDUNET Management

A. Overview

EDUNET is a comprehensive educational information service system that is provided by KERIS and allows the sharing of education-related information between teachers, students, and parents. Students and adults can access high quality education information at anytime and location via a PC with an Internet connection. EDUNET was launched as a full-fledged service in September 1996 (Figure 5).

EDUNET supports the educational environment that students knowledge-based require, and allows education-related information that is scattered among databases to be shared between as many users as possible. By providing useful educational information, EDUNET offers a service and

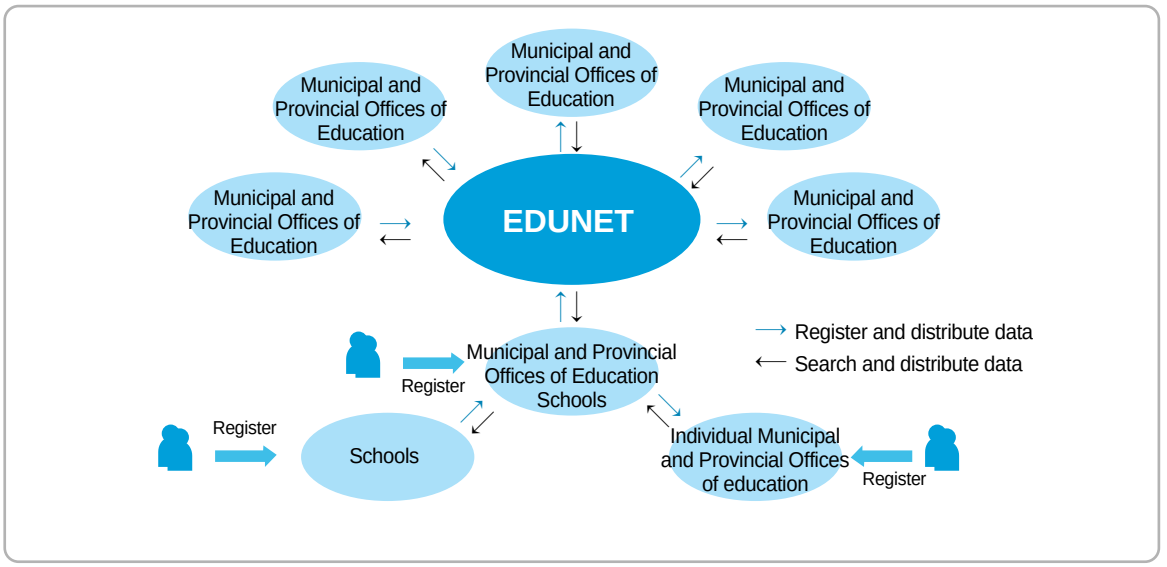
platform for realizing cyber education and provides an educational information infrastructure which uses ICT. As part of its mission, EDUNET supports the improvement of public education through the use of the Internet and has developed an effective delivery system for distributing education information to PCs connected to the network.

B. EDUNET Operations

Since the EDUNET service was launched in 1996, the number of subscribers has risen by 110% annually. As of June 2003, EDUNET has more than 5.03 million registered users and is the premier education information service in Korea. After the completion of the development of nationwide educational information based on standard metadata in May 2002, EDUNET offers an upgraded service that allows for an integrated search of education content stored in EDUNET and in 16 Municipal and Provincial Offices of Education.

After September 2002, the EDUNET service was reorganized into four channels: integrated search, teacher, student, and educational community channels. The integrated search channel was created by redesigning and integrating the various databases that were stored in different departments so that a comprehensive search of resources could be offered. The teacher channel provides teaching material for each semester and organizes material by subject. Teachers can select and discard materials as they choose and apply them in the classroom. The student channel is a 1:1 customized service that

<Figure 5> EDUNET Model



allows students to interact with an online teacher through a Q&A service. The education community channel operates a project-based teaching room, research room, homeroom, and club room as a service to students and teachers. This supports eight different types of ICT adapted teaching model used in classrooms. The project-based teaching room supports discussion-oriented teaching, cooperation-based teaching, experience-based teaching, and scientific experiment-based teaching processes. It also complements regular classes by linking together the online and offline learning experience.

4. Standardization of Educational Information

A. Overview

Standardizing educational information is necessary to effectively develop an information distribution system. Developing this system requires passing through an initial stage, an expansion stage, a control stage, an integration stage, a management stage, and a mature stage. Altogether there are six stages involved (Figure 6).

Currently, Korea is in the control and integration stages of development. The current issues under consideration are dividing the responsibility of developing resources, managing the data quality, and building a standardized interoperable system.

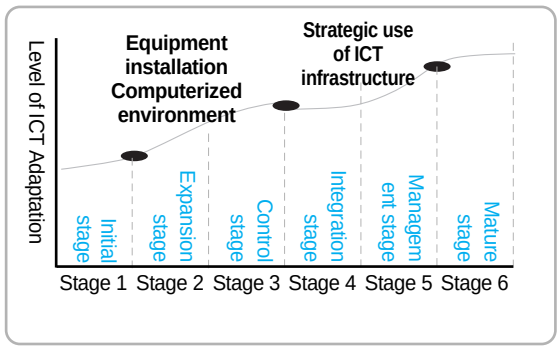
In September 2002, the Ministry of Commerce, Industry and Energy (MOCIE) announced the "Promotion Plan for the e-Learning Industry" and proceeded to develop new e-Learning technologies and appropriate industry standards.

The "2003 Promotion Plan for using ICT in Schools" set by the MOE & HRD, stressed the importance of developing a standard format for educational information. Thereafter, KERIS began selecting a uniform standard for educational content and a standard category system to facilitate the creation of educational information. Setting uniform standards encourages the sharing and creation of quality content and developing standard metadata for educational information allows for quicker and more convenient access.

B. Developing Teaching Materials and Setting Uniform Standards of Distribution

Guidelines for developing teaching materials that support the teaching process have been

<Figure 6> Development Stages of a Knowledge Resource System



created and distributed. This allows management of the quality of teaching materials and the design of an interface that is user-friendly without compromising the teaching material itself.

Uniform standards are being adopted by those who create content for distance learning institutes. As well, the curricula of distance learning colleges are being shared, and this will help improve the quality of content and standardize the format of teaching materials. In 2002, a guideline for standardizing educational content was developed and distributed to Offices of Education. A "Follow the Textbook" teaching resource has been developed and incorporates the Sharable Content Object Reference Model (SCORM). It is currently offered as a service on EDUNET. In Korea, educational materials are now efficiently shared, distributed and promoted.

The "National Educational Resources Sharing System" that KERIS operates is the world's largest nationwide system for sharing and distributing educational content. All educational information is stored in a standardized way. Currently, the "Nationwide Educational Information Sharing System" is offered as a service on the Integrated Search channel on EDUNET.

In the " National Educational Resources Sharing System " service, more than 270,000 pieces of educational information have been compiled and made available to the public as of July 2003. By late 2004, more than 450,000 pieces of educational information will be stored in the system.

5. The Use of ICT in School Libraries

As school libraries are core facilities that can contribute substantially to improving public education, the government has turned its focus to libraries.

In March 2000, the "Adapting ICT in Libraries Master Plan" was established to increase library use through the introduction of ICT. For two years, the Pilot Project for the Master Plan was carried out.

The environments of school libraries was improved and the " Adapting ICT School Libraries Master Plan," was approved in August 2002 to clearly define the key role that school libraries will now play. Libraries will be further improved by expanding library collections and facilities. Other plans include improving programs that use school libraries, building a cooperative system for supporting school libraries, and hiring librarians who can professionally maintain a library.

The project for introducing ICT into school libraries began in 2002 and was divided into two main parts. The first project goal was to build a digital data lab in each school library in order to allow elementary and secondary school students to access books in the library collection and conduct research over the Internet. The second goal was to build digital lab support centers that can use the Internet to distribute data from the offices of education. In 2003, digital data labs were

established in over 130 schools and digital lab support centers were installed in the 9 offices of education able to procure the equipment that was necessary.

Thus far, expanding basic library facilities by building digital data labs and digital lab support centers has been the main priority in adapting ICT to libraries. The next step of the project will be to launch various content services that will allow the sharing of information across agencies and to offer reading services.

6. Adverse Impact from Using ICT

Korea has 16.7 million Internet users as of May 2003 and the fourth highest population of active Internet users in the world at 13.1 million. With the rapid growth of the Internet comes the potential for an adverse impact on society. The dangers are mostly caused by harmful information that emerges in the information age.

These new adverse consequences to ICT include violations of privacy, compromised personal information, proliferation of unsolicited e-mail, the spread of computer viruses, hacking attacks, cyber-terrorism, violation of intellectual property rights, illegal copying of software, addiction to the Internet, and distribution of explicit images and harmful information.

Many youth are seriously addicted to the Internet and explicit images are distributed among children.

As a part of the project to address these adverse consequences, the MOE & HRD launched an ICT training program for parents. This is an effort to use information ethics courses to teach parents of school children how to provide guidance to avoid the adverse moral effect the Internet can have on youth. The Municipal and Provincial Offices of Education have acknowledged the need for an ICT-related ethics class for students and have allocated time slots in schools to teach ICT-related ethics. Experts knowledgeable about ICT issues are invited as speakers to schools and ICT-related ethics topics are discussed in relevant school subjects. Other school-led programs for teaching ICT ethics have been created and methods for blocking harmful information have been developed and employed in schools. Professional information ethics training programs have been developed for teachers for the purpose of building the skills necessary to teach information ethics courses. The goal of these efforts is to instill a strong ICT morality among students.

The MOE & HRD is addressing the adverse impact that the Internet has on society by helping develop online communication skills among parents so that they can give guidance to their children. As well, the MOE & HRD have begun offering information ethics courses to students.

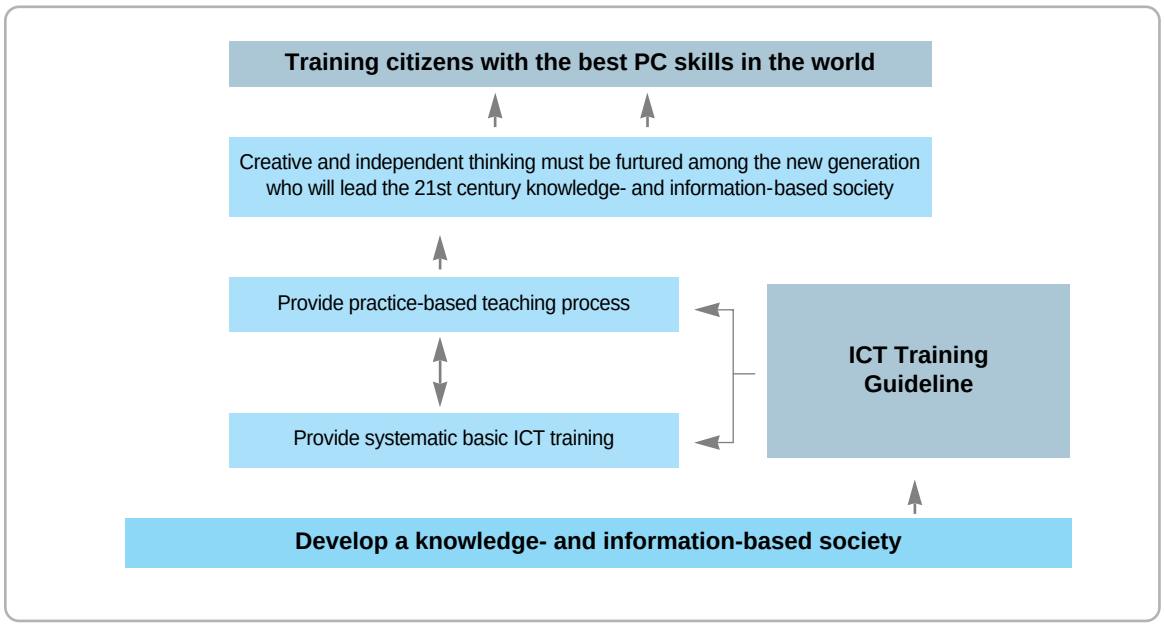
Chapter 3
Support for Adapting ICT into Elementary and Secondary Schools

1. Guidelines for ICT Training in Elementary and Secondary Schools

To nurture creativity and independent thinking among the new generation of workers, the MOE & HRD have prepared several initiatives to improve teaching processes through the adaptation of ICT (Figure 7).

The ministry drafted an Guideline for Adapting ICT into Elementary and Secondary School Education in August 2000 and copies of these guidelines were distributed to Municipal and Provincial Offices of Education. The guideline prescribes basic ICT training and education for all citizens, and provides recommendations for

<Figure 7> A Plan for Developing Human Resources for the 21st Century



creating a school curriculum by explaining which teaching styles are effective for different subjects.

"The Guideline for Adapting ICT into Elementary and Secondary School Education" emphasizes fostering skills in information processing, emphasizing practical use of ICT to complete school assignments, customizing ICT in education for different schools, regions, and students, and selecting appropriate material that will teach students the use and functions of ICT.

Basic ICT training is composed of required courses for each grade - from 1st grade to 10th grade. There are 10 stages in the ICT basic skills and 5 topics such as "Understanding Information and ICT Ethics," "Basic PC Skills," "Using Software Programs," "PCs and the Internet," and "General Activities" are covered.

More than 10% of curriculum is recommended to be allocated for programs using ICT. Basic ICT lessons should be included in other school subjects as part of an introduction to ICT. Curricula should be modified to incorporate ICT lessons into regular school subjects appropriately. The adaptation of ICT lessons in school subjects has been implemented in the 1st and 2nd grades of elementary schools in 2001 and in 2002, 3rd and 4th grade classes began ICT lessons. In 2003, ICT lessons will be taught to all grades. In secondary schools, ICT lessons will be adapted into the 7th National Curriculum and Information Literacy Test can be deployed based on school principal's discretion.

A 2000 survey designed to determine the level of ICT used in education found that more than 10% of the composition of each school's curriculum consisted of ICT skill-building classes. In elementary schools, an average of two hours per week an average of two hours per week was allocated for free activity classes. In most cases, about one hour of the free activity classes were spent on ICT training (Survey on ICT in 7th National Curriculum and Research on Student ICT Skills Standard).

2. Developing Course Material and Setting Standard ICT Skill Levels among Elementary and Secondary School Students

In a knowledge-based society, information is created, dispersed, and deleted constantly, so it is important to develop skills in finding the necessary information for solving a problem or completing an assignment. In order to cultivate these skills, "Research on Developing Curriculum and ICT skills among Citizens," and "Research on Curriculum and ICT Skill Standard for Students" were launched in 2001. Following this, the government used research findings to develop the ICT Skills Standard for Students (ISSS). The ISSS defines the skill requirements for students in different grades from elementary school to high school. The information life cycle (collect information → analyze and interpret information → share and deliver information) along with

security issues and information ethics is the underlying basis of the ISSS.

The ISSS extends beyond translating PC skills into equivalent ICT skills. Instead, the ISSS evaluates a range of skills that are necessary for processing information.

Therefore the ISSS, developed at the national level, sets the tone and direction of ICT training in schools and the entire education system. This evaluation system will be the underlying foundation for developing human resources with a globally-competitive edge. In the future, an enhanced infrastructure will be developed to equip citizens with the best PC skills in the world.

3. Supporting Programs for Adapting ICT into Education

Support for schools that want to adapt ICT into education are provided by supporting the activities of ICT course study clubs and issuing scholarship grants for using ICT in education. In addition, pilot school programs for researching ICT in education were conducted and academic competitions of ICT use were held. Support has been given to exhibitions of National Educational Software Contest, while students with competent PC skills and schools that performed exceptionally well in using ICT in education were rewarded.

A. Support for ICT Teachers Communities

Support for the teachers communities for researches on ICT adaptation in teaching and learning was sporadically extended by civic and provincial administrations until wider funding for ICT study clubs was made available in 1999 through the “Promotion Plan for Building ICT skills among Teachers”. The goal of developing teachers’ ICT Skills has been implemented by providing ICT training for teachers and supporting ICT self-study among teachers. Support for teachers communities is one of the best ways for encouraging teachers to develop ICT skills. In addition, the cost of supporting teachers communities is much lower than providing ICT training and results have been comparatively better.

An average of 2 million won(US$1,600) was donated to each of the 100 top ICT teachers communities in 1999. In 2003, an average of 5 million won(US$4,100) in support was extended to the top 200 ICT teachers communities. 20% of the support grants came from the Informatization Promotion Fund while the Municipal and Provincial Offices of Education contributed 80% of the funds.

B. Pilot School Project for Adapting ICT into Education and Scholarship Grants

The "Pilot School Project for adapting ICT into Education" was independently carried out by the MOE & HRD and the Municipal and Provincial Offices of Education before 2000. The MOE & HRD and the Municipal and Provincial Offices of Education continued to collaborate in research projects and shared research material after 2001. Through these joint efforts, quality educational content was developed for the 7th National Curriculum.

The MOE & HRD designated 10 schools as research schools for using ICT between 1999 and 2000. An additional 23 schools were given this designation in 2001, and in 2002, 21 more received designations by the MOE & HRD. In 2002, the research theme was "Developing Processes and Models for ICT-based Teaching of School Subjects" and schools were assigned ICT research projects in specific subjects that required the creation of multimedia teaching materials.

Four schools under each Municipal and Provincial Offices of Education were selected for the "Pilot School Project for adopting ICT into Education" in 2003. Various ICT-based educational resources that were already developed and introduced on school websites were collected and compiled into a single database in 2003. The resources stored in the database can be freely accessed over school networks and brought into classes by teachers across the nation. Through the creation of excellent educational resources and a pilot school project for researching how to adapt ICT into education, the government is maximizing the effectiveness of adapting ICT to the curricula while still minimizing cost.

C. Scholarship Grants for Using ICT in Education

Since 2001, the MOE & HRD have offered ICT training programs for supervisors. Some of these include "ICT Training Programs for supervisors. For supervisors of Municipal and Provincial Office of Education", "Developing Supervising Material for Adapting ICT into Education," and "Support for Self-Training Programs in Adopting ICT into Education."

These scholarships will reinforce the importance teachers place on adapting ICT into education while introducing ways to use ICT-based educational content in classes. Through supporting the methods that schools have developed to accelerate the adaptation of ICT in teaching processes, the government is contributing to the overall use of ICT in education across the nation.

D. Contest for Adapting ICT to Class Teaching

Contest for Adapting ICT to class teaching designed to improve teaching processes using ICT were first held in 2003. The preliminary

competitions held at the municipal and provincial level were divided into three sections: teaching process, scholarship, and school management. Contestants that won preliminary competitions advanced to the national competition. The contest serves to encourage the research and development of teaching methods that use ICT. Through this contest, participating teachers think of ways to improve teaching processes and, in doing so broaden their own skills. The winner of the national competition will have his or her entry featured on EDUNET where it will be shared with other schools.

E. Support for Elementary and Secondary Schools that Effectively Adapted ICT

The MOE & HRD established the "Evaluation System on Adapting ICT into Education" in April 2003. This system will allow the balanced development of ICT across regions by reducing the digital divide between schools. The annual comprehensive evaluation of the use of ICT in education allows the government to monitor the quality of ICT use in education and provide the appropriate support.

Elementary and secondary schools that perform well in the evaluations will be rewarded while underperforming schools will receive financial and administrative support along with consulting services to enhance and upgrade their facilities.

F. Nurturing Students who Excel in Using PCs

Elementary and secondary school students who have excellent PC skills will be designated as "Promising Children who excel in using PCs[MW4]" and will receive extra support. In order to produce the brightest minds in the world and foster strong commitment among students to ICT training, students who display excellent PC skills will be supported by the government. To promote the program for supporting students who excel in using PCs, a student communities for these students will be created and supported. Excellent students will also be designated as helpers for introducing ICT into schools.

4. Distributing the Benefits of ICT

A. Overview and Goals

As the digital divide issue has become one of social issues, the government enacted the "Bridging the Digital Divide" Law in January 2001 to provide a legislative framework for reducing the digital divide. This law ensures that people with low incomes, residents of farming and fishing villages, the handicapped, senior citizens, women, and people who cannot access or use information services due to economic, regional and physical constraints will be able to freely access information via an information network.

This promotes the balanced growth of the national economy and enhances the quality of life for citizens. In September 2001, 14 ministries established an agency-wide "Comprehensive Plan for Bridging the Digital Divide (2001~2005).

The MOE & HRD are preparing projects that support ICT training for students and parents from low-income families. The goals of this project are as follows. First, the digital divide among groups that lag behind in using ICT will be reduced by offering wider access to ICT training. Second, ICT training for students from low-income families will be enhanced. Third, the "Let's Keep up with the Kids" program will benefit low-income families and people who live in farming and fishing villages by providing extra support for operating Internet Classrooms for Parents. Fourth, low-performance PCs will be donated to underdeveloped nations and other acts of international cooperation in the field of education will be supported. These efforts will contribute to reducing the digital between developed and underdeveloped nations. In order to efficiently distribute the benefits of ICT among citizens equally, interagency collaboration is increasingly important.

B. Overview and Future Directions

The MIC, other ministries, government agencies, local self-governing bodies, universities, and private institutions are conducting ICT training. In particular, the MOE & HRD, MIC, and SK Telecom have jointly organized a 62.25 billion won(US$51.875 mil.) program that provides ICT training to students from low-income families or in rural areas. The government provided more than half of the budget through a 39 billion-won(US$32.5 mil.) contribution and SK Telecom donated 23.25 billion won(US$19.375 mil.). Since April 2000, students under the care of a single parent, families with a handicapped member, or parents on welfare are able to receive a basic education in ICT. More than 500,000 children have participated in this program. 50,000 students who excelled in the program were given free PCs. Since 2002, government subsidies were given to these children to cover their Internet service fees for five years. The government has spent 13.27 billion won(US$11.058 mil.) on PC leasing fees to provide these 50,000 free PCs, and 12.87 billion won(US$10.725 mil.) was spent on subsidizing Internet service fees.

"Internet Classrooms for Parents" were installed in elementary and secondary schools across the nation to provide free ICT training to low-income families in urban areas and people living in farming and fishing villages where Internet access is almost nonexistent. In 2003, the "Let's Keep up with the Kids" program was launched in approximately 900 elementary and secondary schools in Korea. Although Municipal and Provincial Offices of Education were allowed to develop their own curriculum, all curricula are able to be completed within 15 hours.

Since 1997, Korea has attempted to bridge the

digital divide with underdeveloped nations by donating free PCs. As a pilot project this year, Korea has provided free PCs and other equipment to underdeveloped nations in the Asia-Pacific region through UNESCO, and will increase its contribution in 2004.

Chapter 4
Teacher Training for Introducing ICT into Elementary and Secondary Schools

1. Develop ICT Skill Standards for Teachers and Courses

Even if every classroom was equipped with the basic infrastructure to allow students complete access to the Internet, this environment will remain unused if teachers have poor ICT skills. For this reason, it is important to set a standard level for ICT skills in teachers. All Municipal and Provincial Offices of Education have launched their own “ICT Skill Standards for Teachers System” and have certified the ICT skills of teachers who meet certain standards. Teacher incentives are also used in this system. However, the standards vary across among different offices of education and in some cases no standards are in place. These problems have increased the digital divide among teachers from different provinces and cities.

Therefore, the MOE & HRD began developing a national ICT Skill Standard for Teacher (ISST) and an appropriate curriculum for teachers.

There are two characteristics of the ICT Skill Standard for Teachers. First, there are different requirements that teachers must meet depending on their school position - teacher, vice principal, or principal. In addition, teachers who are in charge of the ICT infrastructure at their schools must meet additional requirements because they have a key responsibility in maintaining and deploying ICT solutions.

The second characteristic of the standard is the focus on different areas of the information life cycle (Collect information °Ê Analyze and interpret information °Ê Share and deliver information, security issues and information ethics)

To compliment the creation of a school environment that is compatible with a knowledge-based society, education in Korea will undergo a transformation where students of the 21st century will be taught by skilled teachers in classrooms of the 21st century.

2. ICT Training for Teachers

A. Overview

The first offering of ICT Training for teachers was conducted at Duksoo Information Industry High School where several vocational high school teachers were given EDPS training through a link set up between the high school and KIST's host computer in 1972. Before 1996, ICT training courses for teachers consisted of basic ICT training; between 1997 and 2000, the first phase of ICT training for Teachers was completed. In 2001, the second phase of ICT training for teachers was launched.

In the first phase of the ICT Training for Teachers Plan, training was administered to more than 25% of all teachers. Thus, all teachers in Korea were to receive ICT training at least once every four years. To build the skills of teachers in using ICT, classrooms were to be equipped with PC equipment and teachers were expected to have PC skills. Standard skills for creating educational resources by using writing tools, as well as basic skills in accessing and using education al information retrieved from the Internet and educational software)were to be acquired by teachers. The level of ICT training for teachers was to be raised every year. Between 1997 and 2000, 339,635 teachers received ICT training which is equivalent to one training session per teacher.

In the second phase of the ICT Training for Teachers Plan, the prime goals was to administer ICT training to more than 33% of all teachers every year. Thus, all teachers in Korea were to receive ICT training at least once every three years. The focus of the training was shifted from teaching basic ICT skills to learning how to introduce ICT into education. In 2001, only 10.9% of all training courses involved using ICT in education but by 2005, the percentage will rise to over 50%. Between 2001 and 2002, a total of 266,814 teachers (an average of 0.8 lessons per teacher) received ICT training. A new framework for the ICT teaching that integrates a variety of educational resources with the teaching process should be developed and deployed.

B. Current Status and Future Directions

ICT training for teachers underwent significant structural changes in 2001. Before 2000, most initiatives to build the basic skills of teachers in ICT were led by the government to achieve a single goal. But in the years before 2002, special training courses were given to regular teachers to produce special teachers who were expert in the use of PCs and in solving problems using ICT.

Under the guidelines set by the Promotion Plan for Using ICT in Schools, "ICT Training for Office Skills" was organized by the Offices of Education, and more than 33% of all teachers were required to take the training course. At the end of the course, the performance results of each

teacher were reflected in the teacher's annual performance reviews. In addition, the Offices of Education developed a "Self-administered ICT training" program for schools and required every school to spend more than 15 hours teaching the program.

To promote ICT training for teachers, several steps must be taken. First, the burden placedon the teacher from using ICT in classrooms should be minimized as much as possible. Second, the various training courses should be developed with the students in mind. Third, the ICT training courses should focus on teaching processes that mimic actual classroom situations.

As the need for ICT training grew, the second phase of the ICT Skill training program was developed. First, a teaching process model that incorporated ICT was developed each of for the 10 basic subjects set by the 7th school curriculum. Second, teaching processes that adapt ICT were developed by taking into account the changing classroom environment - multimedia labs, module classrooms, and classrooms upgraded to accommodate ICT. The training programs continue to be developed to build skills which allow teachers to design their own courses.

Many factors must be evaluated while implementing an ICT Skills training program. First, what it means to introduce ICT into education must be clearly defined. Second, teaching methods need to be subject-specific. Third, data regarding the different ICT teaching methods for each subject must be accumulated and analyzed to discern specific areas where ICT should be adopted. Fourth, training programs must recognize that teachers should be at the center of the teaching process (Table 6).

<Table 6> ICT Training Program by Subject

Year	Subjects	Teaching process model	Class outline and teaching processes plan	Training program
2002	Korean language, Social Studies, Science, English, Common subjects (5 subjects in total)	3~5 types of models per subject (Total: 20 models)	Two models for each class subject (elementary and secondary schools) x 2 (Total: 80)	One program per subject (elementary and secondary schools) Total: 10
2003	Ethics, Math, Technical Studies (boys) Home Economics (girls), Physical Education, Music, Art(6 subjects in total)	5 types of models per subject (Total: 30 models)	Two models for each class subject (elementary and secondary schools) x 3 (ICT-supporting classrooms, Module classrooms, Multimedia Lab) (Total: 180)	One program per subject (elementary and secondary schools) Total: 12 programs
Total	11 subjects	50	260	22

Note: Figures for 2003 are estimates

Source: MOE & HRD, 2003 Promotion Plan for Using ICT in School Education

3. Using Distance Learning in Training Teachers

Distance learning has been introduced to allow teachers a wider selection of training courses and to reduce the burden of taking required training courses for teachers. The purpose of distance learning is to encourage teachers to build professional teaching skills. Time and location constraints can also be overcome by offering distance learning rather than teaching courses at a training institute. Outstanding teaching methods are taught in the courses via distance learning .

The basic direction is to develop distance learning curricula by giving universities, colleges of education, general training institutes, and private distance learning institutes accreditation as certified distance learning training institutes if they meet certain criteria. Distance learning institutes will be linked with distance learning colleges that were established under the Lifelong Learning Act. A council composed of distance learning training institutes, universities, and private institutions will be established to jointly operate distance learning programs and develop new content. Distance learning will be made available at work, home, and school for students, teachers, and adults.

In December 2000, several universities and private institutions that met the criteria of the government were given accreditation as distance learning training institutes. Establishing distance learning training institutes is best carried out by adding distance learning departments to established teacher training institutes rather than building new exclusive distance learning institutes.

In 2003, many kinds of training courses were offered and the number of people who enrolled in the courses increased. In 2000, 74 different courses were initially offered and since then the number of course offerings has increased significantly. A wide range of courses are offered in various specialized fields.

Although it is new, the emergence of a knowledge-based society and the advances in ICT have made the distance learning teacher study program one of the most successful projects in spite of the fact that it is so new.

4. Certification of ICT Skills for Teachers

The Certification of ICT Skills for Teachers was established and planned by the Municipal and Provincial Offices of Education without influence from other areas of government. Several civic and provincial administrators wished to commission universities to develop and administer the certification system while allowing regular inspections by local government. Other administrators wanted to independently develop an evaluation tool and administer the certification exam once a year. In the years before 1998, a few Municipal and Provincial Offices of Education took the lead in developing an evaluation test of ICT skills for teachers.

The Plan for Supporting the Adaptation of the ICT Skill Evaluation Test for Teachers was created in 1999 as one of the initiatives under the MOE & HRD's Master Plan for "Training Elementary and Secondary School Teachers in using ICT." Every year, 10% of all teachers in Korea must take a test evaluating their use of ICT. The government pays half of the costs of administering the test, which is held nationwide. In 2001, the MOE & HRD changed the name of this test to "Certification of ICT Skills for Teachers". The criteria for evaluating ICT skills are presented to provincial and civic administrators and the results are reflected in each teachers' performance reviews.

The 2002 plan for supporting the certification of ICT skills among teachers is an initiative designed to persuade teachers to develop their ICT skills voluntarily, so that teachers can handle the new teaching methods of the information age. As of 2002, 292,621 teachers have taken the evaluation test (77% of all teachers in Korea) and 181,585 teachers have certified their ICT skills. Thus 47.3% of all teachers who took the evaluation test passed. The results of the test are reported in the teachers' annual performance review.

Chapter 5
The Use of ICT in Special Education and Educational Programs for the Gifted

1. The Use of ICT in Special Education

A. Overview

"The use of ICT in special education" is an initiative to deploy equipment and programs that can support special education courses given to students who are handicapped in way that makes it difficult for them to acquire knowledge.

The project is included in the ICT in education initiative led by the MOE & HRD. The main project mandates support for Internet service costs at elementary and secondary schools and the operation of the Korean Education Network. Developing educational resources to encourage the adaptation of ICT in education and building skills in applying and using ICT are also important initiatives. However, there is no specific initiative developed solely for special education.

The project for using ICT in special education is under the supervision of the Korea Institute for Special Education - an affiliated agency of the MOE & HRD. The institute's major responsibility is operating the Special Education Information Center that was established in 1998 and introducing ICT into special education. Every year, training courses and counseling for special education teachers, parents and handicapped students are offered. The institute also develops and distributes multimedia content.

B. Current Status

As of July 2003, the average number of PCs available at special schools in Gyeonggi-do, Chungcheongbuk-do, Jeollabuk-do, and Jeollanam-do is significantly lower than schools in other provinces. Schools in Ulsan and the urban areas of Gyeonggi-do had the highest average number of PCs per student (Table 7).

Most special schools use the Internet service provided by KT, and connection speeds in vary from 256Kbps to 2Mbps.

ICT training courses for special education teachers offered by the Municipal and Provincial Offices of Education teach Internet skills, ICT courses, ICT solutions, and content creation. There

<Table 7> PCs Installed in Special Schools

Region	Number of Special Schools	Total number of PCs	Number of PCs per school	PCs per student
Seoul	29	2, 885	99.5	1.9
Busanl	10	796	79.6	2.3
Daegul	8	799	99.9	1.8
Incheonl	6	542	90.3	2.3
Gwangjul	5	483	96.9	2.0
Daejeonl	4	336	84.0	2.6
Ulsanl	2	176	88.0	5.1
Gyeonggi-dol	23	1,429	62.1	3.5
Gangwon-dol	5	544	108.8	1.6
Chungcheongbuk-dol	9	628	69.8	2.2
Chungcheongnam-dol	5	322	64.4	2.6
Jeollabuk-dol	9	530	58.9	2.2
Jeollanam-dol	7	430	61.4	2.3
Gyeongsangbuk-dol	7	833	119.0	2.0
Gyeongsangnam-dol	6	578	96.3	2.0
Jeju-dol	2	145	72.5	2.4
Totall	137	11,456	83.6	2.1

Source: Survey of Special Schools in Korea, July 2003

is a huge disparity in the frequency and number of teachers taking these ICT training courses in different regions.

In the future, the project for using ICT in special education will expand of the number of teachers who will receive training and revise the means of delivering special education services. Various systems will be created to provide a quality service for special education teachers, handicapped students, and parents. These services will be available at any time and in any location.

2. Introducing ICT into Educational Programs for the Gifted

It is important to expand into educational programs for the gifted by introducing ICT. In this initiative, an online system of educational programs for the gifted will be created, the format of educational resources for the gifted will be standardized, educational resources will be shared, and an online database of educational programs for the gifted will be built.

The adaptation of advanced ICT will allow gifted children and specialists in educational programs for the gifted to overcome time and location constraints and offer an interactive experience. Different agencies will be able to share

educational resources for the gifted if study material and documents are stored in a standard format. Online course material is being developed according to the Shareable Contents Object Reusable Model (SCORM), which is the unofficial international standard, rather than using an online format of developing course material.

An online system that allows for the storage and management of educational information for the gifted will be created. This will assist research on educational programs for the gifted and substantially improve education. In the midst of these developments, the use of ICT in educational programs for the gifted will continue. As the ICT environment changes and experience is gained from teaching students, new issues will emerge.

The cyber education of the current 15 Science Education Institutes for the Gifted across the nation offer one-on-one lessons between teachers and students and a performance feedback system to support more users. Educational resources such as a text-based Q&A system, interactive java language-based programs, flash movies, and lecture videos of educational programs for the gifted are being developed.

Part 3. Introducing ICT into University Education

Chapter 1
Introducing ICT into Universities

Chapter 2
The Use of Information Technology in Academic Research

Chapter 1
Introducing ICT into Universities

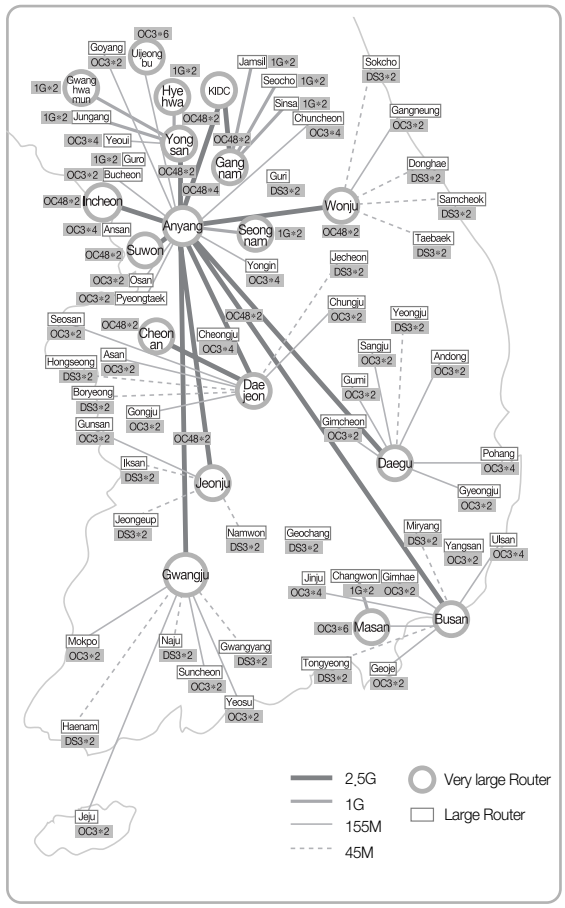
1. University Computer Networks

The Korean Education Network supports academic research conducted at domestic universities and facilitates the fluid flow of information by providing high-speed Internet services (Figure 8).

The government has continuously supported academic research and education in an effort to enhance national competitiveness. In 1983 the government developed a high-speed communication service and user environment to facilitate the free flow of academic research information between domestic and foreign universities and colleges. During the years from 1983 and 2000, a backbone network was created and operated by the government. Through a reorganization in 2001, KT and Kornet were selected to manage the network on behalf of the government for two years and continue to provide services to member agencies.

As demand for lower-cost and more efficient services grew and the selection process of the two service providers was questioned in terms of objectivity and fairness, open bidding on

<Figure 8> The Korean Education Network



management rights for the backbone network was held and Dacom's BORAnet won the rights to the network. As of July 2003, 291 agencies and institutions are using the Internet services provided by the Korean Education Network and the total demand in bandwidth is 7.5Gbps. Total bandwidth demand for 2003 is estimated to rise to 10Gbps. As a part of the project for using ICT in education in 2003, government funding for the project will be extended.

The Korean Education Network is planning the "2003 R&D initiative to Improve Network Performance and Efficiently Operate the Korean Education Network" which will result in service improvements to the Korean Education Network. The results will also be used as objective data to help select a service provider in 2004.

2. The Use of ICT in Universities

A. Introduction

Improving the use of ICT in universities is a project that strives to expand the ICT infrastructure to improve user access to information, introduce ICT into education and academic research, and use ICT to make college administration duties transparent and efficient.

The computerization of school affairs between 1970 and 1980 was an effort to enhance the competitiveness of Korean colleges and universities, and the beginning of the use of ICT in college education. During the 1990s, the growth of the Internet increased the importance of information. Domestic universities began to build information infrastructures and develop information service systems to adopt ICT into education. These projects were completed with their own funds and administration staff.

The government introduced ICT into elementary and secondary education in 1997. Since then, they have also launched an effort to use ICT in college education by supporting the development of information services, the expansion of college campus LAN networks, and further improvements to the service infrastructure. These improvements are vital step in creating an educational and academic research environment that can produce graduates who can lead the knowledge-based society of the 21st century.

As the first phase of introducing ICT in nationwide elementary and secondary schools was completed ahead of schedule in 2000, the focus on improving the ICT skills of the next generation of teachers became a top priority. Thus, ICT training labs that exclusively train students enrolled in the department of education were installed in 11 colleges of education nationwide (1999) and 13 national colleges of education (2000~2001).

The e-Campus Vision 2007 was established in the latter half of 2002 as a 5-year plan. To pursue the goals of this plan, a next-generation university administrative system Enterprise Resource Planning(ERP) was created in 2003 as well as a college e-Learning support center. Government

support was extended to expand the ICT infrastructure at national universities and complete the plan for using ICT in the educational environment of colleges of education. The formation of the Council for Introducing ICT into Universities and the expansion of the scale and scope of using ICT are initiatives which strive to elevate the quality of college education. The government is trying to redirect university's independent efforts to adopt ICT into a cooperative system where universities collaborate with one another to leverage ICT (Table 8).

B. Current Status and Future Directions

The next-generation university administration information system, ERP is an action plan for using ICT in the administrative of eight national universities of industry. This plan was standardized in 2003. An ERP system was deployed in Jinju National University. Among colleges of education, administrative duties were standardized in 11 colleges. ERP systems are also used in Chuncheon National University of Education and Daegu National University of Education. Identical administration information systems (ERP) across eight national universities will handle much of university administration by 2006. By 2007, the systems at eleven colleges of education will be added.

The e-Learning support center is equipped with the necessary facilities to offer an alternative to regular university courses through e-Learning solutions. The center will also develop and provide content and allow the sharing of its facilities among college departments. 151 out of 376 universities in Korea offer either a full or partial e-Learning education. The key component of e-Learning is the e-Classroom. As of June 2003, over 53.3% of the 204 universities surveyed have installed e-Classrooms. The government will build and operate 10 university e-Learning support centers in 10 districts around the nation to help expand the university e-Learning infrastructure and make e-Learning an integral part of college

<Table 8> Current Status and Outcomes of Adapting ICT in National Universities

Year	Activity	Institutions
2003	Expand ICT infrastructure	Three provincial universities
	Install ICT training lab	Six national universities that are lagging behind in using ICT
	Develop Next-generation university administration information system, ERP	One university of industry ※ Including the standardization efforts among 8 national colleges
	Build College e-Learning Support Center	One national college
	Promote Universities of Education	- ICT infrastructure expansion project covering 12 colleges - Two administration information systems (ERP) for two colleges of education - One distance learning(training support center
	Provide funds for operating network	49 national universities

Source: MOE & HRD, June 2003

education.

To promote the use of ICT in the educational environment of colleges of education, one of the 12college colleges of education and Korea National University of Education were awarded a research support center and funding for distance. This followed the evaluation of business plans submitted by interested colleges in 2003. The selected colleges will receive grants to build the infrastructure necessary for deploying a distance learning training system. To support the ICT infrastructure in education, one PC per five students will be installed in the 21 colleges of education by 2007 and 70% of all classrooms will be e-Classrooms. In addition, the Internet connections speeds at college computer networks will be upgraded to gigabit speeds and security and backup systems will be deployed.

A chief information officer (CIO) system is being prepared for adaptation among universities so that ICT projects in universities are executed under a centralized management structure. The formation of a University Information Council (tentative name) is underway to integrate the different college and university councils on ICT and bring together CIOs from each university.

3. Cyber University

The development of advanced ICT has enabled people to learn in cyberspace. The MOE & HRD conducted a pilot project for launching cyber universities between March 1999 and February 2000. Revisions to the Lifelong Learning Act in August 1999 and the enforcement ordinance of the Lifelong Learning Act in March 2000 were made and as a result a distance learning university-like lifelong learning facility (cyber university) was approved by the government.

The establishment of the cyber university was authorized by Article 22 and Section 3 of the Lifelong Learning Act. A two-year college degree and other two-year courses were initially offered by the cyber university. In 2000, nine cyber universities were approved by the government, six were registered in 2001, and one was established in 2002. As of 2003 16 cyber universities have been accredited by the government and each cyber university is working hard to raise the quality of the educational service that they provide.

Among the cyber university freshmen class of 2003 most freshmen are between 20 and 30 years old. 82.2 percent of all freshmen are older than the average freshmen in regular universities. Therefore, cyber universities are also institutions for lifelong learning. 90.5% of all students enrolled in cyber universities have graduated from high school or have passed the high school equivalency test. The introduction of cyber universities has given adults who have not yet attained college degrees the opportunity to receive higher education. 91.3% of all cyber university students are employed and work while they pursue their degrees and a large number of employed students seek to learn a new set of skills and receive

retraining through cyber universities.

In the courses offered at cyber universities, 23.3% of all courses are management-related and 21.5% are ICT-related. Courses which end in the issuing of a certificate of qualification are popular among students (example: Social Welfare major). In this respect, cyber universities are different from regular universities that offer academic majors based on teaching fundamental theories. Because they offer retraining for adults, cyber universities are meeting the demands of both society and the employment market.

4. Two-Year Colleges: The Use of ICT in Education

A. Introduction

In the past 20 years, two-year colleges have grown in scale and scope with significant results. Two-year colleges graduate more than 40% of all graduates of higher education (2002) and have thus made a substantial contribution in producing a diverse pool of human resources. Graduates of two-year colleges have the required professional vocational training to work at specialized tasks immediately.

The two-year college courses are centered on vocational training and must adapt to the constantly changing economic environment. The "Korean College CIO Committee" (www.kcio.or.kr), which is a cooperative body composed of chief information officers at two-year colleges, was established in 1999.

B. Current Status and Issues

Two-year colleges either use the education network provided by the Korean Education Network (KREN) or commercial networks. Average Internet connection speeds among these networks are 32.9Mbps. A survey of the number of PCs in each national, public, and private two-year college was conducted and results have shown that private colleges have more equipment than public or national colleges.

Two-year colleges provide practical vocational training and produce the majority of workers for the ICT industry. According to the Korean Council for College Education, more than one-fourth of all freshmen enrolled in two-year colleges had ICT-related majors in 2003. Since 2001, many ICT-related programs at two-year colleges have been reorganized into 3-year courses. These changes have improved the level of education for students and in effect produced better trained students. Training for professional technicians who manage advanced technology has been strengthened.

The Korea Cyber College Association (KCCA) was launched in 2002 and is an inter-college organization that offers joint cyber courses. 19 two-year colleges have joined the KCCA, and students enrolled at the KCCA member colleges can transfer their GPA scores to other member colleges. Liberal arts courses are offered to full-

time and part-time students via the Internet. In the future, a lifelong learning facility that supports distance education will be established and will offer accredited degrees.

Heavy investment in ICT solutions and equipment for two-year colleges has improved the ICT infrastructure in colleges. Colleges are constantly expanding and improving their ICT infrastructure to improve the quality of education that they provide. Until recently, most of the ICT solutions deployed in colleges were mostly hardware based.

In the future, two-year colleges need to carry out strategic reorganization efforts that will harness ICT to create value through the production and use of information. The specifics of these initiatives should be based upon the ideas presented in the "e-Campus VISION 2007" that was announced by the MOE & HRD in December 2002.

Chapter 2
The Use of Information Technology in Academic Research

1. The Use of ICT in Academic Research

The use of ICT in academic research will be the source of innovation for developing the society, culture, economic growth and human resources essential to a knowledge-based society.

As highly-skilled workers and the capacity to innovate are important factors for maintaining national competitiveness, the "Brain Korea 21" project was launched to heavily invest in university research. However the college libraries, equally important in providing a quality university education and academic research, have been under-funded until recently.

The process of introducing ICT into academic research requires the optimal collection and dissemination of information, to support researchers, college professors, undergraduates, and graduate school students. Thus, the efforts to collect and disseminate information by the Korea Scientific & Technological Information Center (KORSTIC, established in 1962), make it a center for the use of ICT in academic research.

To prevent overlapping investments in ICT projects while developing a networked environment, the Basic Plan for Developing a National Digital Library was presented in 1997. Upon completion of the goals outlined in the plan, the National Digital Library was established and integrated the databases and archives of the National Library of Korea, National Assembly Library, Supreme Court Library, Korea Advanced Institute of Science and Technology (KAIST) library, Korea Institute of Science and Technology Information (KISTI), KERIS, and Rural Development Administration's Korea Agricultural Science Digital Library. The Knowledge Resources Management Act was enacted in 2001, and the nation's digital resources were managed in four main categories - academics, culture, history, and science and technology. As a part of the knowledge resources management project, the Korea Knowledge Portal (knowledge.go.kr) was created by 2003 to integrate government databases that are scattered across agencies.

College libraries are essential for supporting university education and academic research, and

the introduction of ICT in college libraries has brought many changes to higher education. As ICT usage increases in college libraries, the types of library services that are offered to students have expanded to include a card catalogue search, online catalogue search, nationwide integrated search, and digital copies of original papers. To successfully implement the project of "Building an Academic User Environment to Improve the Knowledge Infrastructure", one of the top ten policy goals for promoting ICT in 1996, the Korea Research Information Center (KRIC) was established. KRIC was a center that distributed academic information between colleges and was affiliated with the Korea Research Foundation (KRF). KRIC was merged with the Korea Multimedia Education Center (KMEC) and became KERIS. After the two centers were combined, computerized college libraries across the nation were linked together in a single network to share academic research. KERIS currently plays a vital role in distributing academic research information.

More than 350 libraries nationwide are using the academic information network that allows the sharing of academic information published by colleges. In addition, a librarian community has emerged that allows librarians working at different college libraries to share their knowledge with one another. To expand the academic information network, the MOE & HRD has extended support to college libraries by initiating the "Project for Building a Database of Archival Material in College Libraries" and "Knowledge Resources Management Project".

2. The Use of ICT in University Libraries

According to Korean Library Statistics, the total spending on university libraries across 258 4-year universities in 2002 was 180 billion won(US$150 mil.). This is an average investment of 700 billion won(US$583 mil.) per university library.

The total number of books in all university libraries is approximately 81.16 million books. 25.5% of these books are foreign-published, and 48% of all journals holdings are foreign. Although there is a large amount of foreign-published material, the academic information service for foreign books is not well coordinated. In addition, although 99% of all university libraries are computerized, only 244 of 377 university libraries possess a host computer.

On the other hand, most university libraries have created a database for all published books. Approximately 44.09 million books are compiled in databases, comprising 54% of the books and published papers stored in libraries. University libraries are trying to improve the user environment for accessing foreign academic information and are building various foreign academic databases. Among databases being built, 35% of foreign academic databases center on humanities and social studies, while 54% focus on

medicine, health, and natural science.

The institutions that offer academic research-related information service institutions are the National Library of Korea, Korea Institute of Science and Technology Information (KISTI), KAIST Digital Science Library, National Digital Library, National Assembly Library, and the Korea Social Science Library (KSSL).

3. Research Information Service System (RISS) Management

KERIS (formerly the Korea Research Information Center) launched RISS in 1998 as a system for national research and information.

The RISS service is a comprehensive listing service that allows the sharing of university resources. The service allows the digital storing of academic papers so that researchers can retrieve the information that they need in a one-stop service (Figure 9).

When the RISS service was launched in 1998, it provided cross-reference services and copies of original research papers from a comprehensive catalogue database that integrated the data from 145 universities and colleges. 440,000 students and researchers registered for the RISS service when it was first launched and the number of registered users and participating universities has since increased. As of May 2003, 388 universities have made their academic resources available on the RISS service and the number of registered academic researchers rose to 510,000.

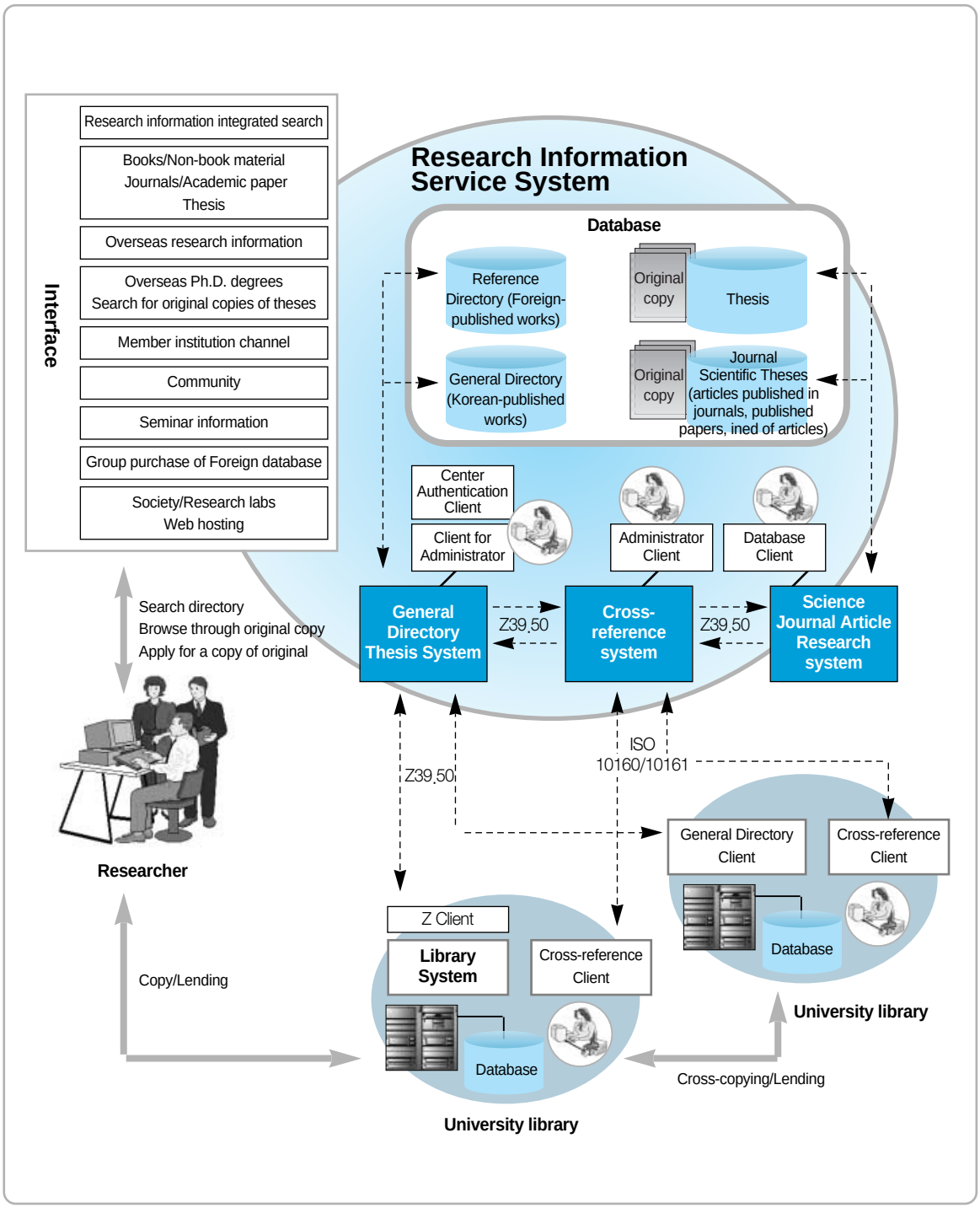
When the comprehensive catalogue service offered by university libraries was initially offered in 1998, there were more than 450,000 pieces of bibliography data and 18 million pieces of compiled data. As of May 2003, the amount of bibliography data has increased to 620,000 and there are more than 27.2 million pieces of compiled data. In the cross-reference service, 30 university libraries joined the service in 1999 and currently all university libraries now participate in the service. 8000 search requests are processed every month. Currently, 11 foreign academic databases are licensed. The total annual savings through this project is estimated at 1.7 trillion won. By May 2003, 450,000 original copies of academic theses in 1,500 fields will be included and an additional 320,000 theses in 700 fields will be integrated into the catalogue service. A total of 770,000 theses in 2,220 fields will be made available.

4. The Use of ICT for Organizing Korean Historical Records

The use of ICT in organizing historical records requires sophisticated management of historical records in order to offer a quick, computerized search.

The National Institute of Korean History (NIKH) has formulated the Comprehensive Development Plan for a Computerized System to

<Figure 9> RISS Model



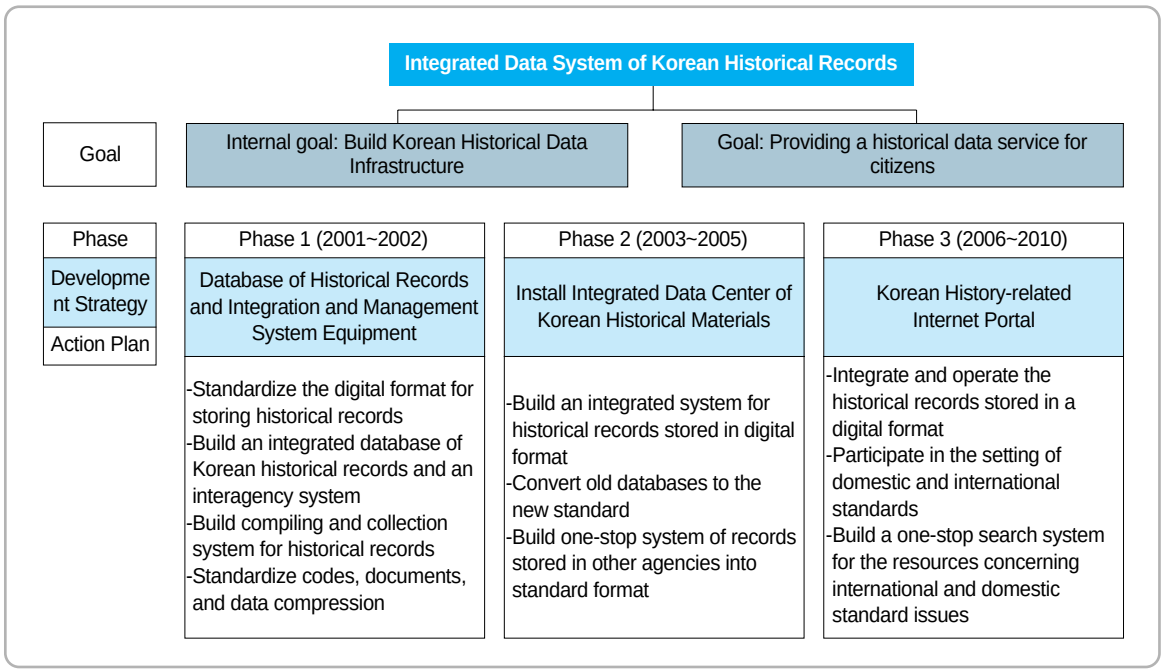
help prepare for the information age. The main goals of the plan are to efficiently manage historical records, provide quick access to information, and facilitate the exchange of information between foreign and Korean historical resources research institutes through a network.

As the Internet revolution began to spread throughout the world, the NIKH launched its own Internet service in 1996. Historical records and current research into Korean history have been catalogued and are searchable through the Bulletin for Korean Historical Studies. More than 40 kinds of historical records are available at the NIKH website.

In 1999, the NIKH embarked on the "Long-term Development Plan (2001 - 2010)." To carry out its mission, the institute presented a vision for an "Integrated Data System of Korean Historical Records" as one of its four main goals. Development plans and strategies were formulated for each phase of completing this system. The plans, goals, and strategy are illustrated in Figure 10.

Using ICT to organize historical records began by collecting and publishing historical records in a database. Afterwards, the creation of a system to manage this information was pursued in accordance with the "The Use of ICT in Korean Historical Records" project. Upon completion of the basic system, the "Integrated Data System of

<Figure 10> Integrated Data Center for Korean Historical Records: Goals and Strategies



Source: National Institute of Korean History (NIKH), Long-term Development Plan, December 2000

Korean Historical Materials Construction Project" was initiated to integrate the databases of relevant agencies into a single service.

In March 2001, the MIC designated the NIKH as the Korean History Information.

Using ICT to organize Korean historical records includes several projects: the search Korean historical terminology thesaurus project, the Seungjeongwonilgi (the daily records of royal secretariat of Chosun Dynasty) project, creation of a catalog of historical materials from abroad and a list of works on Korean history. In addition, the "Integrated Data System of Korean Historical Materials Construction Project" is a service that customizes various historical records according to the needs of the agency.

2003

Adapting Education to the Information Age

Part 4. The Use of ICT in Lifelong Learning

Chapter 1

Developing Human Resources that Will Lead the Knowledge-based Society

Chapter 2

Introducing ICT in Education for Women and the Disadvantaged

Chapter 1
Developing Human Resources that Will Lead the Knowledge-based Society

1. The Use of ICT in Lifelong Learning and Vocational Training

A. The Use of ICT in Lifelong Learning

A. Background and Objectives

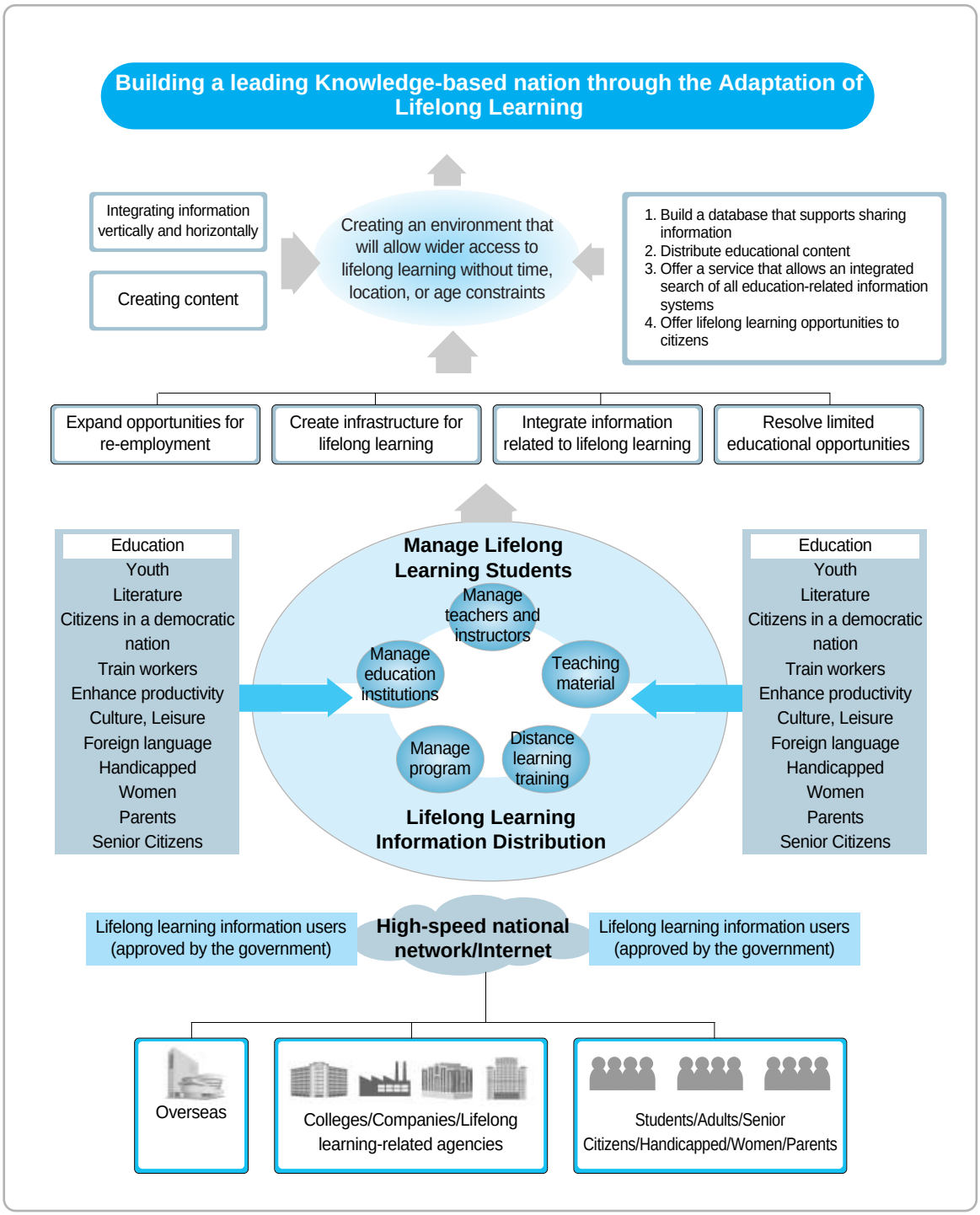
The National Center for Lifelong Education leads lifelong learning initiatives through expanded use of the "Lifelong Learning Comprehensive Information System." This system has been in operation since 2000, and it facilitates the spread of information related to lifelong learning by systematically collecting and compiling lifelong learning information. Citizens can access all kinds of lifelong learning-related information through this comprehensive system. The main purpose of the system is to provide a vertical and horizontal network that links together central and local lifelong learning information centers with other lifelong learning organizations and facilities. This network enables citizens to obtain the information they are seeking in the shortest possible time and at a minimal cost. Overlapping investments in the field of education will be eliminated through this comprehensive network.

The Lifelong Learning Comprehensive Information System is a total information system that allows anyone to access lifelong learning services from anywhere at any time. Other benefits from the system include the integration of educational resources through horizontal and vertical network design that interconnects lifelong learning organizations and facilities together. Based on a system of integration and interoperability, lifelong learning-related information can be compiled in a single database.

B. Future Directions

The National Center for Lifelong Education website (ncle.kedi.re.kr) went online in 2002 to provide lifelong learning-related information. As a source of lifelong learning content and program information for citizens, the National Center for Lifelong Education (NCLE) website has been expanded and redesigned to make the website

<Figure 11> Lifelong Learning Comprehensive Information System Model



more accessible and convenient to use.

To enhance the accessibility of the NCLE website while expanding the network of lifelong learning-related agencies, the National Center for Lifelong Education, the local Lifelong Learning Information Center, and the Lifelong Learning Hall have been connected to offer a more comprehensive database.

The lifelong learning information system plays a key role in expanding the opportunities of lifelong learning among all age groups regardless of their income level, and time constraints.

The lifelong learning program management database system that was developed in 2001 uses an AI engine that regularly conducts online searches of lifelong learning-related program information and creates a database that automatically categorizes the collected data. This database delivers speedy search results to users. Thus, citizens can easily find information regarding the program that they wish to take by searching through this database. In 2002, the search results of this program information automatic compiling system were more than 95% accurate.

Since 2001, a statistical system that analyzes the results of the lifelong learning initiative has been under development. In 2002, this cyber education system was built into the Lifelong Learning Comprehensive Information System.

The construction of the lifelong learning information infrastructure is the responsibility of the National Center for Lifelong Education, which is located within KEDI. The lifelong learning information system carries out the functions of the central lifelong learning information center, as well as supporting the operation of local lifelong information centers in 16 cities and provinces. Additionally, the system manages the lifelong learning electronic library, the network and databases of lifelong learning agencies as well as containing information about the profiles of each instructor. In the future, the lifelong learning information system will develop teaching material and strive to make e-Learning more effective in practice.

2. The Use of ICT in Vocational Training

The goal of vocational training is to improve the abilities and performance of people who will work in specialized areas or who are currently employed. Depending on the needs of each person, vocational training can offer training in basic office skills or specific knowledge about specialized vocational tasks.

After a reorganization of the government structure in January 2001, the MOE & HRD was established and focused on expanding the role of vocational training in developing national human resources. Because using ICT in developing national human resources is part of their mandate, the Korea Research Institute for Vocational Education has developed the national human

resources development information network (NHRD-Net: www. hrd.go.kr), comprehensive career information network (Career-Net: www.careernet.re.kr), and VIVA Vocational Schools (VIVA: www. viva.re.kr) to help introduce ICT into vocational training.

The NHRD-Net was launched in January 2002 to gather all educational information, job listing information, employment information, and industry-specific information stored among ministries. All human resources-related information is be provided to citizens through NHRD-Net.

Career-Net will support the career development and lifelong learning of all citizens by collecting and distributing information related to employment and career planning. This comprehensive career information network was developed in 1999 to provide a variety of career-related information concerning employment, college admission criteria and career planning and counseling. As of May 2003, 235,339 people are registered on Career-Net.

The Viva Vocational School was launched in April 2002 to support career counseling and employment for vocational high school students. The Viva service is linked with Korea Research Institute for Vocational Education and Training's Career Information Center's Career-Net. Viva Vocational School provides a specialized service for vocational high school students, teachers, and parents and as of May 2003 has more than 7,800 registered users. The actual number of users is though to be higher than the number of registered users.

Another source of information related to vocational training is offered by the Human Resources Development Service of Korea (HRD Korea). Q-Net (www.gnet.go.kr) is a web portal that provides information regarding different kinds of certificates of qualifications in Korea and overseas. The overwhelming number of people seeking information about certificates of qualifications at the Ministry of Labor and HRD Korea, lead to the development of Q-Net, which was created to offer this information online. Work-Net (www.work.go.kr) is operated by the Work Information Center - an affiliate of the HRD Korea - and provides job listings, career consulting services and employment opportunities. Work-Net is widely used by job information centers on college campuses, employment-related institutions and companies that offer job training courses.

Chapter 2
Introducing ICT in Education for Women and the Disadvantage

1. Introducing ICT in Education for Woman

The "Basic Plan for Developing National Human Resources" was established in 2001 to prepare Korea for new requirements in human resource development. The basic policy goal of the plan is to introduce advanced techniques for managing and harnessing national human resources. This requires supporting women who are creative and who can enhance national competitiveness. Through this, women can improve their employment prospects while improving their quality of life and economic status. In order to achieve these goals, a support infrastructure for encouraging better ICT skills among women so that some can work as professional ICT specialists.

When the MIC established the "Comprehensive Plan for Expanding ICT Training to all Citizens," women and especially homemakers were considered to be the group with the least amount of knowledge about ICT. The Ministry of Gender Equality was established in 2001 and created the "Basic Plan for Promoting Introducing ICT to Women" (2002~2003) in order to systematically introduce ICT to women (Table 9).

The ICT training project for women was one of the programs developed as part of the Basic Framework for Introducing ICT to Women. This project was carried out by the Woman Resources Development Center, and it offered re-employment opportunities for women in the ICT sector. Because of the demand for workers in the ICT sector, women who completed the ICT training courses were usually offered immediate employment after finishing the course program.

The MIC has provided support for the hardware, software, network equipment, and office equipment required by the Woman Resources Development Center, Women's Development Center, and educational institutions that offer opportunities for women. 69,030 women completed the ICT course training and as a result 4,160 women found employment and 2,743 women went on to attain certificates in ICT-related fields.

In a knowledge-based society, ICT-related

<Table 9> Basic Framework for Introducing ICT to Women: 2002~2006

	Major Goals	Action Plans
Basic infrastructure	Offer women wider access to information and create a supportive infrastructure	- Create and operate Women-net - Build volunteer network
Professionalism	Improve the ICT skills of women	- Give ICT training to women
Support	Support the use of ICT in the private sector	- Support projects that will improve the ICT skills among women
Evaluation	Policy evaluation after conduction survey of the ICT skills among women	- Conduct survey of the ICT skills among women and develop guidelines
International Cooperation	Cooperate in ICT projects with other nations	- Build and operate the Asia-Pacific Online Education Center - Support the spread of ICT skill among women who will enter the small business workforce

policies that serve to enhance the ICT skills of women must be based on a principle of equal treatment for women and men. In addition, diverse educational programs must be developed for women and should be customized to meet their needs. The emphasis on expanding the scale and scope of education must be redirected to elevate the quality of education. It is also important that course content is relevant to women, and that there is a support system that facilitates that participation of women in society.

2. The Use of ICT in Youth Education

As we enter the new millennium, a new knowledge-based society has emerged and the new century is regarded as both the century of culture and the era of globalization. In the midst of these momentous social changes, the social needs of the youth have increased and changed. With the advent of the Internet, mobile phones, and other digital devices, youth lead the information revolution. Cyberspace provides youth with new opportunities in a different kind of world. On the other hand, the downside of cyberspace is that some youth have difficulty distinguishing the virtual world from reality, while others are exposed to harmful information without parental guidance. As a result, it is important that the introduction of ICT to youth use new information channels to protect and foster the growth of youth as well as supporting the creation of a healthy culture in using information; monitoring and preventing the flow of harmful information; and preventing access to harmful information.

Policies surrounding the introduction of ICT to youth are formulated and supervised by the Ministry of Culture and Tourism's (MCT) youth bureau. The youth bureau is leading projects that use the special characteristics of various government divisions. In summary, the Korea Institute for Youth Development (KIYD) provides

information services and carries out research in the use of ICT. The Korea Youth Volunteer Center (KYVC), National Youth Center of Korea (NYC), and the National Council of Youth Organizations in Korea (NCYOK) provide training program information; the Korea Youth Counseling Institute (KYCI) handles youth counseling services; the Korea Youth Internet Broadcasting Station, Research Center for Korean Youth Culture and SSRO.NET are leading private institutions that provide youth-related services; and the MIC and other central bureaus organize and sponsor youth-related information projects.

The Commission on Youth Protection is in charge of using ICT to protect youth while the Information Communication Ethics Committee (ICEC), central government, public agencies, various private organizations, and the parent supervisory board of information play vital supporting roles in implementing these policies.

The goals of the policy for using ICT to protect youth include fostering a healthy mental and physical growth among youth by protecting them from harmful information, and creating a helpful information environment for youth that will allow them to develop into well-balanced individuals.

Because the use of ICT across society and among youth is spreading more rapidly than expected, the government has been slow in setting ICT-related policies. Under these circumstances, the only way to encourage the use of appropriate ICT is to foster the healthy growth of youth by systematically introducing relevant policies.

3. The Use of ICT in the Private Sector

The use of ICT in private education is centered on vocational schools, university-affiliated lifelong learning institutes, social education institutes, private corporations, media, various organizations, and private institutes. There are two types of ICT training given by sectors beginner classes given to new PCs owners by PC manufacturers as a part of their customer service and professional ICT training where people learn how to become ICT specialists.

Cultural Centers operated by department stores, television networks, media companies and the YMCA also offer classes in PC and Internet skills to students and homemakers.

The ICT-related courses offered at various culture centers and media corporations are mostly beginner or intermediate courses for teaching basic PC skills or introductory courses on the Internet. However, a few educational agencies offer special professional-level training courses similar to vocational training.

In the private sector, academies that teach PC skills are the most common ICT training institutions. According to the Korea Association of Hakwon (KAOH) Council for PC Education, as of July 2003 there were more than 353 institutes that offer professional ICT courses. Moreover, institutes that offer PC courses and ICT training are playing a key role in helping achieve the government's initiative for introducing ICT

training to citizens. In 2000 and 2001, 400,000 women received ICT training through the "1 million Homemaker Internet Training" project and 20,000 people completed courses in the "ICT Training for Small Business Owners" project. In late 2001, an e-Korean education, which is a 40-hour intermediate training course, was established and focuses on using the Internet. In 2002, 127,906 people received training at 42 on-campus ICT courses and 451 institutes that teach basic PC and Internet skills.

According to the "Industry Report and Plan for e-Learning" presented by the MOCIE in 2002, e-Learning businesses will sustain annual growth of 32.5% and contribute to the overall growth of next-generation Internet businesses. The size of the market is forecasted to reach 2.5 trillion won in 2003. Since 2001, businesses that have provided PC and ICT training are gradually shifting their focus to e-Learning services on the Internet. In June 2003, an e-Learning Industry Development Bill was presented to the national assembly to promote the growth of the online education industry.

Currently, there are more than 100 private educational businesses that are offering cyber ICT training.

4. The Use of ICT in Education for Overseas Koreans

Amidst the globalization and market liberalization trends of the 1990s, Korea's economy posted rapid growth and the population of overseas Koreans gradually increased. To support human resources development of Koreans overseas, a plan for establishing an overseas office of education was presented. There are two types of education offered to overseas Koreans. The first type is a Korean educational course that allows students to continue their studies in Korea without interruption while students are introduced to the local language, history and customs of the foreign country. Most students in these courses are children of embassy staff or Korean employees working at a foreign branch on short assignments. The second type of education focuses on assimilating the children of Korean immigrants into the public school system. These students are enrolled at regular public schools in their adopted country and learn about Korea in out-of-school surroundings.

In the late 1990s, the MOE & HRD studied the benefits of distance learning on the Internet and subsequently developed Korean Language Study on the Internet (KOSNET) - a distance educational system. This system was a major development in using ICT in education for overseas Koreans.

Beginning from February 2002, the National Institute for International Education Development created a dedicated website for the Overseas Korean Educational Institutions. Educational activities at the Korean Education Center, Korean schools, Korean language schools, and overseas Korean educational institutions are promoted on

the website which also provides basic information about each school. The website also supports the sharing of educational resources and information scattered across Overseas Korean Educational Institutions (Table 10).

The objectives of the KOSNET project are three-fold. First, it is important to provide Korean teaching material to the more than 565,000 overseas Koreans living in 151 countries (including 490,000 Korean students staying abroad temporarily). This includes using the Internet to effectively deliver Korean language courses. Second, among the 11 G7 information-based society pilot projects, Korea has joined Project Ⅲ, which is a bicultural education and training project that offers foreigners who are interested in learning the Korean language convenient access to information related to Korean language education. Third, an Internet server for Korean education will be built for overseas Koreans and foreigners to provide Korean language educational software and educational information.

Another Internet service that offers Korean language courses to overseas Koreans and foreigners is "Korean Tutor (www.korean

<Table 10> Websites of Overseas Korean Educational Institutions

Names of Institutions	Website	
Tokyo Korean Schooll	www.tokos.ed.jpl	Korean, Japanese
Moscow Korean Schooll	www.mokos.rul	Korean
Korea International School in Yanbienl	htt://www.ykschooi.org/l	Korean
Korea International School in Beijingl	www.kisb.net/l	Korean
Taipei Korea Elementary Schooll	taipeikoes.coml	Korean
Yantai Korea International Schooll	www.koreaschool.org/l	Korean
Korean International Schooll	www.kis.edu.hk/l	Korean, English
Jakarta International Korean Schooll	www.jiks.coml	Korean
Shanghai Korea International Schooll	www.skoschool.coml	Korean
Korean School in HCMCl	www.kshcm.netl	Korean
Singapore Korea Schooll	www.koreansingapore.org/school/l	Korean
The Korea Education Institution in Kanagawal	www.hangul-kanagawa.or.jpl	Korean, Japanese
Korea Education Center in L.A.l	www.kecla.orgl	Korean, English
Korean Consulate General in Houstonl	www.koreahouston.orgl	Korean, English
Korea Education Center in Sydneyl	www.korconsyd.org.au/en/index.htmll	Korean
Korea Education Institution in Sapporol	www.mc.megafit.net/~korea/l	Japanese
Consulate General of The Republic of Koreal	www.koreanconsulate.orgl	Korean, English
Rostov-na-Donu	www.rosec.narod.rul	Korean
Korea-Erziehunginstitut in Deutschlandl	www.keid.del	Koreanl
The Korea Education Institution in Tokyol	www.kankoku.gr.jp/tokyol	Korean, Japanese
The Korea Education Institution in Saitamal	www.kankoku.gr.jp/saitamal	Korean, Japanese
The Korea Education Institution in Okayamal	www.kankoku.gr.jp/okayamal	Korean, Japanese
The Korea Education Institution in Sendail	www.kankoku.gr.kr/sendail	Korean, Japanese
Gifu Korea Networkl	www.gifukorea.netl	Korean, Japanese

Source: MOE & HRD, March 2003

tutor.com). This website will be the one of the first online services that will spread awareness of Korea's alphabet, "Hangeul" to the rest of the world.

Other educational services include the Korean Studies and Korean course, and the Korean Language Program for Youth.

2003

Adapting Education to the Information Age

Part 5. The Use of ICT in School Administration

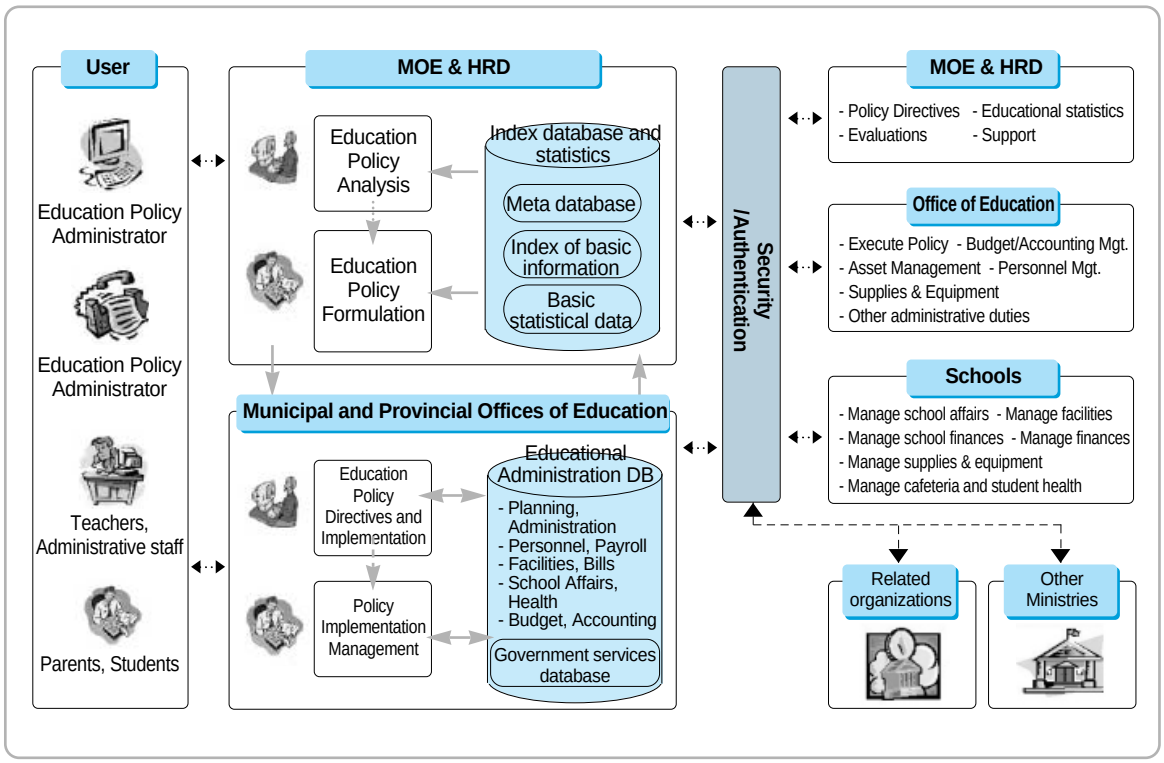
1. Construction and Management of National Education Information System

A. Introduction

National Education Information System (NEIS) is a system that connects government agencies and administrations with elementary and secondary schools through the Internet, compiles a database for Municipal and Provincial Offices of Education, and electronically processes school administrative tasks including accounting, personnel management, and school affair duties. The system was created after the information infrastructure in schools was completed and advances in ICT had been realized (Figure 12). The objectives of the system are to reduce the burden of administrative tasks on teachers by introducing new ICT methods of doing work, to provide academic reports regarding the current status and outcomes of students to their parents, to enhance the satisfaction levels of citizens towards the government by improving government services, and to make education administrative duties more efficient and transparent.

The NEIS project was chosen as one of the 11 major government initiatives by the Special

<Figure 12> NEIS Model



Committee for e-Government, which was established in early 2001. By October 8, 2002, the development of NEIS-compatible application software, hardware and system software was completed. Personnel management, payroll management, and accounting tasks are among the 22 administrative tasks made available on November 4, 2002. This pilot service, which included five school affairs-related areas, was extended until February 2003 and the full service was launched on March 2003 across the nation.

B. Current Status

A computerized system for managing school affairs, undergraduate courses, school entrance exams, student health insurance and other administrative tasks was completed in August 2002. This system was to be launched in time for the beginning of the second academic semester of 2002 but teachers requested further testing of the service before its release, and so the MOE & HRD delayed the service. Fifteen schools under five Municipal and Provincial Offices of Education were selected for the pilot project. This was later expanded to include 276 schools from 16 Municipal and Provincial Offices of Education. In March 2003, a total of five administrative services were offered online.

Initially, access to information concerning school affairs, student admissions, and student health care was judged to be in violation of basic human rights by the National Human Rights Commission of Korea. Based on the commission's recommendations, the MOE & HRD made changes to the system in December 2003 to ensure that basic human rights were protected.

The general administrative services provided by NEIS (which include personnel management, budgeting, and accounting) are main administrative duties carried out by educational administration agencies. Thus, NEIS was launched in November 2002, and schools and offices of education began using the available services. In December 2002, 13 government services were made available on the NEIS government service system and student-related government services were expanded in April 2003. A second project for developing NEIS application programs will be launched in the latter half of 2003, to improve the NEIS and make its use more widespread.

C. Operation

The goal of the software is to automate school administrative processes. The automated system should be developed with cooperation from school administrators and should address the needs of students and teachers alike.

From August through September 200, 2400,000 educators were trained on how to use NEIS, and 27 different topics were covered. The MOE & HRD and Municipal and Provincial Offices of Education established the training program and between January 2003 and March 2003, approximately 340,000 additional educators were

given user training in new software tools for administering school affairs. Additional training programs continue to be held.

Fifteen schools selected by the MOE & HRD and 256 schools selected by the Municipal and Provincial Offices of Education are participating in this NEIS pilot project.

The Central Internet Advisory Committee was formed in May 2002 to speed up the process of introducing the NEIS system to schools and to encourage wider use of the system. The committee had consulted schools on more than 3,182 occasions by December 2002. School administrators and 102 advisors were appointed as members of the NEIS Central Internet Advisory Committee from July 2003 until June 2004. The NEIS Central Internet Advisory Committee and 211 general administrators were gathered together to address general administration duties from July 2003 until June 2004.

2. Managing the Education Statistics Information System

The education statistics project is an official government-led project that conducts a survey of all education-related agencies across the country to collect data regarding the state of the education system in Korea and the total number of trained workers. The MOE & HRD established an Education Statistic Center under the supervision of KEDI and developed an educational statistics database in 1998. The center was then reorganized to utilize a computerized system where data entry, verification, and analysis were carried out on PCs. This system allowed the sharing of educational data across other government agencies in an efficient manner while providing accurate information. After the Ministry of Education (MOE) was reorganized as the MOE & HRD in 2001, collecting statistical data about the state of human resources became a priority. The educational statistics data system is a collection of three systems: the educational statistics survey system, educational statistics service, and educational statistics analysis and estimation system.

3. The Use of ICT in Educational Administration by the MOE & HRD

The introduction of ICT in educational administrations encouraged by the MOE & HRD is an effort to handle administrational tasks more efficiently. The main purpose of this effort is to complete the creation of Korea's e-Government ahead of schedule with the sharing and distribution of information over networks and by providing educational administration services that are centered on the needs of citizens.

From 1997, an electronic document management system was developed and implemented in order to make educational

administration more efficient, create a better working environment, and increase the use of electronic documents.

To achieve the goals of the "Improving Work Processes" plan that was presented in late 2000, the electronic document management system was developed, In March 2002, the MOE & HRD began receiving all documentation from 415 institutes (universities, 2-year colleges, and college-affiliated agencies) electronically. All agencies under the supervision of the MOE & HRD now use electronic documents for interagency collaboration and communications. In addition, electronic bulletin boards (BBS), an electronic approval system, and an electronic document delivery system have been launched.

The MOE & HRD website (www.moe.go. kr) was first launched in 1998. It has been redesigned three times, and offers a convenient and efficient service to citizens.

Among the notable features of the MOE & HRD Website is the enormous number of links - over 9000 - to other websites. This is the greatest number of links offered by any government agency's website. The English language version of the MOE & HRD website is responsibly managed and updated constantly. Questions posted on the website from citizens are directly answered by MOE & HRD administrators who also post their names and the exact time that they replied with answers.

Beginning in 2003, 90% of all approvals signed by management were electronic approvals. According to the revised office management regulations, all electronic documents that are transmitted or received through the MOE & HRD electronic document system must be processed by a standard distribution method by the end of 2003. The MOE & HRD electronic document system will be enhanced to better support electronic documents by setting a national standard for e-Documents. Starting in January 2004, the MOE & HRD electronic document system will offer the Lightweight Directory Access Protocol (LDAP) service.

2003

Adapting Education to the Information Age

Part 6. The Use of ICT in Education Led by Joint Collaborations at International Organizations

1. OECD - Researching and Developing Educational Policies for the Efficient Use of ICT

In September 2002, the Organization for Economic Cooperation and Development (OECD) established the Directorate for Education as an organization that would solely focus on the field of education, and delegated issues regarding employment, labor, and social welfare to other agencies.

As an OECD-sponsored project, the importance of developing appropriate educational policies for effectively adopting ICT was agreed upon at the forum "ICT: Policy Challenges for Education" in October 2002. This project mandates four areas of development.

The first area for development requires the formulation of a policy that would introduce ICT in education for the disadvantaged student and adults, out-of-school youths in 2003. The second area sets developing a policy for ICT educational resources as a priority for 2004. The third area suggests developing supportive policies for teachers that encourage the introduction of ICT in Education in 2004. Lastly, the institutionalizing of ICT in the education system will start between 2004 and 2005. A program for adapting successful examples of ICT use in education, while respecting ICT-related laws and the impact on school education from government policies that promote the use of ICT in education will be created.

Following discussions on "Topic 1 - Policy Development for ICT in Education: The Disadvantaged students, "the OECD and Hungary's Ministry of Education jointly organized the "ICT in Education: Supporting Out-of-School Youths and Adults" workshop held in Budapest in June 2003. In the workshop, a PISA study was discussed that suggested how ICT in education could level the playing field for out-of-school youth. Successful examples in Finland and Korea were also presented and in-depth discussions about ICT policy for improving special education were held.

In addition, a conference titled "ICT in Non-formal and Adult Education: Supporting Out-of-School Youth and Adults" was held in Philadelphia in November jointly held by OECD-NCAL(National Center on Adult Literacy). The OECD has analyzed the regulations, physical infrastructure, teacher performance and out-of-school education in Korea as it relates to the use of ICT in learning. Through participating in this conference, the trends and pending issues among OECD member economies can be understood and comparisons can be made between polices mapped out by developed nations and Korean policies.

2. APEC

A. Consortium for APEC Cyber Education Cooperation

The Consortium for APEC Cyber Education Cooperation was established to realize the vision set forth by President Kim Dae-jung's "E-education Project" proposal during the 7th APEC Summit held in New Zealand. In 2001, four member economies (Korea, U.S., Hong Kong, New Zealand) joined together to form this consortium and later in 2002, Taiwan, Thailand, China, and Malaysia also became members of the consortium, bringing the total number of members to eight.

The consortium launched projects designed to bridge the digital divide within the Asia-Pacific region. The goal of the consortium is to provide services and distribute information that will improve ICT training for teachers and school administrations among member economies. The Consortium for Cyber Education Cooperation agreed on four strategic goals that were announced at the 2000 APEC Education Ministerial Meeting. These goals are: recognizing the importance of ICT as a core competency for students, enhancing the quality of teaching and teacher development, cultivating sound management practices among policy-makers and educators, and promoting a culture of active engagement among APEC member economies. In order to realize these four goals, the consortium created an educational web portal that provides information and resources, online and offline communities, and sponsors projects for teachers among APEC member economies in the field of human resource development.

The Consortium for APEC Cyber Education Cooperation is leading an effort to bridge the digital divide and strengthen international exchange. These efforts carry on the tradition of international cooperation and help to discover solutions that will address these issues. The consortium activities are considered a model for the international community among APEC members.

B. ACEN Webzine Published

The APEC Cyber Education Network's (ACEN) Webzine at http://acenwebzine.or.kr is an online forum for the teacher community within the APEC member economies. Here, educators can share their knowledge and their experience of adapting ICT into education. The Webzine will foster the expansion of using ICT in education.

Members of the ACEN teacher's press corps are drawn from among teachers in the APEC member economies and currently Korea, Indonesia, Thailand, Japan, Taiwan, Australia, Philippines, New Zealand, Chile, and Hong Kong are represented in the press corps. The first issue of the ACEN Webzine was published in September 2001 and came in 4 editions - Korean, English, Indonesian, and Thai. Since then, the teachers'

press corps and the International Internet Volunteers have merged to become the APEC Learning Community. The current Webzine issue covers the results of volunteer projects carried out by teachers.

C. International Internet Volunteers (IIV)

International Internet Volunteers (IIV) are a group of volunteers who visit APEC member economies that are developing their ICT programs to train local educators how to use ICT in education.

Forty college students and four professors from Korea visited Indonesia and Thailand in 2001 as Internet youth volunteers. In 2002, International Internet Volunteers visited China, Philippines, Indonesia, and Thailand. People from other APEC member economies besides Korea can also apply to be international volunteers and join the IIV to work in member economies that need help in adopting ICT.

Chile requested the help of volunteers in 2003 and thus there are a total of five member economies assisted by the IIV.

D. APEC Cyber Education Cooperation Research

The APEC Cyber Education Cooperation Research project is a joint international research effort to solutions to bridging the digital divide among APEC member economies using online education.

Through 2002 and 2003, the Korean government has supported the "Mathematics and Science Teaching Process for Elementary and Secondary Schools Seminar" which is a part of Malaysia's APEC Cyber Education Cooperation Project as well as Taiwan's "APEC Cyber School Project." Through the founding of the Institute for APEC Cyber Education (IACE), the Korean government will continue to support education-related projects to strengthen cooperation in education between APEC member economies.

E. International Journal for APEC Cyber Education (IJACE)

The secretariat of the Consortium for APEC Cyber Education Cooperation (ACEC) first published the International Journal for APEC Cyber Education (IJACE) in 2003 to share information regarding the use of ICT in the APEC Cyber Education project among the students, teachers, and school administrators in each member nation. The educational technology department of Indiana University assisted the secretariat in publishing the IJACE.

3. UNESCO Projects

Under the motto of "Basic Education for All," UNESCO is emphasizing the introduction of ICT in education in order to provide equal access to a quality education for all students. As a part of the

goal to expand the role of ICT in education, in 2001 the Institute for Information Technologies in Education (IICTE), a UNESCO-affiliated organization, launched a project to develop multimedia content through a joint effort involving ICT specialists in the educational field from 13 nations in the Asia-Pacific region. Following these ICT-related projects, the "2003 Asia and Pacific Program for ICT in Education*" was planned and two workshops and one research assignment were completed as a result. Because Korea has a highly developed ICT infrastructure, Korea was invited to participate in this workshop and share its experiences with other nations. The nations participating in this project are Afghanistan, Bangladesh, Cambodia, Indonesia, Mongolia, Pakistan, Philippines, Thailand, and Vietnam.

* http://www.unesco.org/bangkok/education/ICT, and http://www.iite.ru

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