Korea's Experiments with Virtual Education

by

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- An evaluation of the effectiveness of a method or approach in which technology is used in teaching, learning or professional development of educators.
- A description of an educational-technology project, along with lessons learned and related costs.
- Defining issues for involving the use of technology in education and recommended strategies and options.
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FOREWORD

The development of the Korean education system over the past 50 years is a well-documented success story. Faced with a devastated national economy and education system after the Korean War and guided by well-planned systemic educational reforms linked to national development goals, Korea achieved universal primary and secondary education in the span of little more than a generation. The high priority of educational expansion and the subsequent high levels of national investment in education paid off in the form of increased foreign direct investment and rapid evolution from a primarily agrarian economy to an industrial economy accompanied by an increase in the standard of living for all Koreans.

At the end of the twentieth century, Korea's new challenge is to keep pace with the rapid changes in the global economy. And, like their predecessors, Korean policy makers in the 1990s responded with strategies for the further expansion of educational opportunities at the tertiary level, especially in the realm of lifelong learning. In order not to be left behind in the evolving economy, the government recognized the urgency of opening up its education system. It had already done so with the creation of the Korea National Open University. But, faced with the need to provide training opportunities for an increasing number of people in a time of financial crisis, the government needed to do more with less. This situation has led to bold sectoral reforms and experimentation with advanced technologies for the delivery of degree programs and lifelong learning opportunities, because it believes that these technologies are cost-effective in reaching large numbers of learners with quality educational programs.

Preliminary results suggest that cost savings can be realized through the careful design of virtual education programs, and that creative alliances with the private sector can produce innovative educational programs. However, the greatest lesson to be learned from Korea's example is that when governments view education as a means to national development, and support that position with financial and policy commitment, real progress can be achieved.
ACRONYMS AND DEFINITIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>BEIT</td>
<td>Bureau of Educational Information and Technology</td>
</tr>
<tr>
<td>BK 21</td>
<td>Brain Korea 21 (21: Twenty-First Century)</td>
</tr>
<tr>
<td>CTTC</td>
<td>Cyber Teacher Training Center</td>
</tr>
<tr>
<td>ICTs</td>
<td>Information and Communication Technologies</td>
</tr>
<tr>
<td>ISD</td>
<td>Instructional Systems Design</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>ITESM</td>
<td>Instituto Tecnologico y de Estudios Superiores de Monterrey</td>
</tr>
<tr>
<td>KMEC</td>
<td>Korea Multimedia Education Center</td>
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<tr>
<td>KNOU</td>
<td>Korea National Open University</td>
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<tr>
<td>KRIC</td>
<td>Korea Research and Information Center</td>
</tr>
<tr>
<td>KVU</td>
<td>Korea Virtual University Consortium</td>
</tr>
<tr>
<td>MIC</td>
<td>Ministry of Information and Communication</td>
</tr>
<tr>
<td>MIT</td>
<td>Massachusetts Institute of Technology</td>
</tr>
<tr>
<td>MOE</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>NTU</td>
<td>National Technological University</td>
</tr>
<tr>
<td>OCU</td>
<td>Open Cyber University</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Cooperation and Development</td>
</tr>
<tr>
<td>OUN</td>
<td>Open University Network</td>
</tr>
<tr>
<td>SNU</td>
<td>Seoul National University</td>
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</table>
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INTRODUCTION

As the demand for higher education and lifelong learning increases everywhere, governments are looking for ways to make their educational systems more effective and efficient. The government of Korea has gone even further in its efforts to reform its education system and prepare its citizens to be leaders in the information age, declaring its goal as no less than the creation of "Edutopia, an education welfare state — a society of open and lifelong education, to allow each and every individual equal and easy access to education at any time" (Presidential Commission on Education Reform, 1997).

The birth of Korea's modern education system can be traced to the establishment of the Republic in 1948. One of the first acts of the new government was to create an autonomous educational structure with a universal and compulsory primary education system. Between 1945 and 1950, the government adopted a 6-3-3-4 school system, founded a national network of public universities, and launched programs to train teachers and to eliminate illiteracy through adult education.

Education enrollments expanded substantially in the 1960s and 1970s, and the country's success in achieving universal primary and secondary education fueled remarkable economic progress, leading to fundamental political and cultural changes at all levels of Korean society (Presidential Commission on Education Reform, 1997; OECD, 1998). This period also saw major reforms in student and teacher education; the founding of the Korea Air and Correspondence University (now known as the Korea National Open University), the Korea Air and Correspondence High School, and the Korea Education Development Institute, an organization mandated to lead future educational research, development and reform.

The focus in the 1980s shifted to ways to improve the quality of education. Reforms were instituted in the country's civil education system and increasing emphasis was placed on personal development and lifelong education. The government also launched a national computer education system and the Educational Broadcasting System, and introduced a new education tax to fund further investments in education, including a massive effort to develop high-level human resources in science and technology. Korea's investment in science and technology education alone increased from US$190 million in 1975 (14.4% of the total education budget) to US$2,077 million in 1995 (19.9% of total expenditures). The 1980s also saw significant improvements in the quality of schools and higher education institutions (Ministry of Education, 1998a).

Over the past decade, Korea has continued to focus on meeting increased public demand for higher education and lifelong learning. However, rapid population growth and increased enrollment at the tertiary level have resulted in overcrowding and a shortage of academic staff. From 1994 to 1998, a Presidential Commission on Education Reform, considered ways to make the Korean education system less rigid and more responsive to the learning needs of students in the twenty-first century. In 1997, the Commission recommended the establishment of a virtual university, a national credit bank system, and the use of advanced technologies in education as possible means for realizing the goal of an Edutopia. To support these recommendations, the government established the Korea Multimedia Center and the Korea Research and Information Center.

The government also is revising relevant laws and regulations such as the Lifelong Education Law and the Higher Education Law. Revisions are aimed at improving quality and access to higher education by introducing market principles and promoting the creation of new types of formal and non-formal institutions, thus maximizing the possible benefits of
Table 1: Number of Higher Education Institutions by Type

<table>
<thead>
<tr>
<th>Higher Education Institutions</th>
<th>Public</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four year universities</td>
<td>26</td>
<td>130</td>
<td>156</td>
</tr>
<tr>
<td>Four year teachers' colleges</td>
<td>11</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Two year junior colleges</td>
<td>15</td>
<td>143</td>
<td>158</td>
</tr>
<tr>
<td>Four year polytechnics</td>
<td>8</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>Four year distance teaching university</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Miscellaneous schools</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
<td>289</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td>(17%)</td>
<td>(83%)</td>
<td>(100%)</td>
</tr>
</tbody>
</table>

To support such initiatives, greater funds have been allocated to the establishment of a lifelong education system (up from US$500,000 in 1996 to US$8.6 million in 1998) and to the development of a greater technology infrastructure in the college and university system (up from US$31 million in 1996 to US$89 million in 1998).

The government's plans for Korea's education system include establishment of an information infrastructure by the year 2005; development of a multimedia database, and heavy investment and training in the use of advanced technologies. The government's efforts to encourage lifelong learning also have stimulated formal and non-formal higher education institutions to restructure and to use new technologies to improve their services.

The principles guiding reforms in higher education include:

**Flexibility.** All Koreans should be able to continue their learning beyond the years of compulsory education and all types of non-formal continuing education should be integrated into the formal higher education system.

**Excellence.** Higher education institutions should educate and train Koreans to be competitive in the twenty-first century.

**Diversification.** Institutions should specialize and diversify their entrance examinations, educational programs, delivery methods and management systems to meet the specific needs of individuals and industries, and to differentiate themselves from other institutions to be more competitive.

**Efficiency.** The restructuring of all higher education institutions should be accomplished in a cost-effective and efficient way, making the best possible use of information and communications technologies.

The OECD team, which examined Korea's education system, remarked that the country's vision for reform is bold, comprehensive, and well suited to meet the challenges of globalization and the increasingly information-based international economy. Moreover, the government's plans enjoy almost unanimous support among the people, and few have even raised objections or concerns about the program's high cost. Koreans have a strong desire to see their country become a world leader in the new information-based economy. Since the early 1990s, the introduction of cutting-edge information and communications technologies has come to be seen as a barometer of national competitiveness and quality of life, and is being specifically pursued as part of a national development strategy (Ministry of Information and Communication, 1998). By 1998-99, Koreans owned over 9 million personal computers (representing a penetration rate of 20 percent of the entire population) and 4 million Internet users (although only 27% were female).

The remainder of this paper will examine the current state of Korea's higher education system, including recent changes and reforms, and will look at government initiatives aimed at promoting the use
of advanced technologies and training. It will trace the impact that Korea's commitment to education is having on educational achievement and national economic growth, and will show how experiments in online education suggest that further investment in virtual education programs could be a cost-effective way to expand overall access. Policy recommendations are offered in the concluding section.

The Korean Higher Education System

Formal higher education institutions in Korea include universities, teachers' colleges, junior colleges, polytechnics, a distance education university, and miscellaneous schools such as theological colleges and seminaries (see Figure 1).

Universities provide four-year advanced education, conduct research in specialized academic disciplines, and offer graduate programs. Korea has 156 universities, 26 of which are public. Most of Korea's 130 private universities operate self-financed lifelong education and training programs. The eleven public teachers' colleges provide four-year pre-service teacher education at the primary level; pre-service teacher education at the secondary level is provided by the colleges and schools of education within the four-year university system and the Korea National University of Education.

Korea has 158 junior colleges, 15 of which are public. Junior colleges provide two-year vocational education programs to provide students with practical skills, and often collaborate with the private sector to develop on-demand curricula, which reflect that sector's urgent training needs. Polytechnics offer four-year technical and engineering programs, both during the day and at night for students with jobs. Korea has 18 polytechnics, including eight public institutions and the Korea National Open University, which offers bachelor's degree programs and non-degree courses to adults with jobs through various distance education methods.

Of Korea's 350 formal higher education institutions, 83 percent are private and 17 percent are public. The MOE funds between 60 and 70 percent of the budgets of public institutions, and less than 30 percent of the budgets of private colleges and universities (OECD, 1998). The Korea National Open University, Korea's only national distance learning uni-
University receives about 35 percent of its budget from the government. Parents and the private sector play a major role in financing higher education in Korea. On average, the MOE has typically funded only 20 to 25 percent of the higher education budget. In no other industrialized country do parents and private educational institutions bear such a heavy financial burden for higher education. With the introduction of market principles into the higher education system, and Korea's recent economic crisis, this situation is not expected to change in the near future.

Since the mid-1970s, the number of institutions offering formal higher education in Korea has increased dramatically, as have the student population, academic staff and educational facilities. Figures 1 and 2 show increases in student enrollment and the number of tertiary institutions. By international standards, Korea ranks very high with regard to higher education enrollments. In 1998, 64.1 percent of secondary school graduates went on to higher education institutions, not including enrollments at Korea National Open University. Despite the increased number of institutions, the rapid growth of the student population has resulted in overcrowded classrooms and a shortage of academic staff and educational facilities (see Table 2). The use of educational technology and distance education programs, however, is expected to solve some of these problems.

Non-formal higher education institutions include lifelong education and training centers affiliated with four-year universities, private independent lifelong education centers, training centers within corporations, government-supported training centers (such as inservice teacher training centers and inservice training centers for civil servants), and adult training programs offered by schools and non-govern-
Table 2: Student/Instructor Ratio by Type of Higher Education Institution (1998)

<table>
<thead>
<tr>
<th>Type of Institution</th>
<th>Students per instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four year universities</td>
<td>36.3</td>
</tr>
<tr>
<td>Four year teacher's colleges</td>
<td>30.3</td>
</tr>
<tr>
<td>Four year polytechnics</td>
<td>72.6</td>
</tr>
<tr>
<td>Two year junior colleges</td>
<td>73.4</td>
</tr>
</tbody>
</table>

*Excluding Korea National Open University

mental organizations. There are approximately 200,000 non-formal education institutions in Korea, including 63,000 private independent lifelong education centers. With the exception of certain government-supported training centers, the government provides no financial support to these non-formal institutions. In 1999, however, the MOE allocated 1.1 percent of its budget to practices in the field of lifelong education, and plans to increase this amount every year (Open University Network, 1999).

RECENT GOVERNMENT POLICIES AND PRACTICES IN HIGHER EDUCATION AND LIFELONG LEARNING

The Korean government has responded to the growing need for lifelong learning through policies aimed at making higher education institutions more flexible, competitive and diverse. Several of these policies are examined in this section.

Introducing Market Principles into the Funding Process

Over the last decade, the government has implemented a competitive funding mechanism for all tertiary institutions, which has taken on greater importance in the face of decreased fiscal resources in light of Korea's recent economic crisis. Funds are distributed on the basis of annual evaluations conducted by a body comprising members from a number of professions. In these evaluations extra points are given to universities which make effective use of information technologies (IT). The importance of these annual evaluations has already led to structural changes in many higher education institutions.

Increasing Autonomy

To respond to the needs of Korea's increasingly heterogeneous population, the government is decentralizing some decision making power to the institutions themselves by encouraging them to diversify their educational approaches and curricula. Toward this end, the government has begun to promote the autonomy of colleges and universities, a move, which represents a significant change. In the past, Korea's educational system was highly centralized, with the national government fixing enrollment quotas and influencing curriculum development, budgeting, and other academic affairs of public and private institutions alike.

Since 1994, tertiary institutions have been able to choose a semester system, to determine the number of credits required for graduation, and to set student quotas. In 1996, the government granted autonomous management rights to seven of the nation's highest-ranking universities. The following year, the comprehensive entrance examination administered by individual universities was abolished and replaced by other selection criteria such as high school achievement, scholastic achievement test scores, and interviews thus providing broader range for colleges and universities to select students.

The Special Budget Act of 1999 has contributed to this autonomy as well by permitting higher education institutions to solicit funds from different sources and to invest those funds in specific program areas. Although it is too soon to tell, it is hoped that this Act will stimulate greater competition among colleges and universities seeking to raise funds from the private sector as well as leave them better positioned to offer diversified and specialized programs, and to experiment with new approaches to education delivery such as virtual education.¹

¹Virtual education is any form of distance education in which an advanced information and communication technology such as the Internet or a teleconferencing system is used as the main instructional and communicational tool (Jung & Leem, 1998).
Increasing Emphasis On Quality

As a result of greater autonomy and an increased emphasis on competitiveness, colleges and universities in Korea have begun to institutionalize quality and management systems, and the government's use of evaluations to make decisions regarding distribution of funds has further accelerated quality concerns. With an increased budget for improving quality (from about US$330 million in 1993 to US$1,014 million in 1996), the government has evaluated all of Korea's higher education institutions based on criteria measuring the quality of the services provided. One important criterion has been the institutions' establishment and use of information infrastructure.

The government has also focused on the improvement of research activities, expanding research subsidies from US$27 million in 1993 to US$90 million in 1996. A post-doctorate training and research system was introduced in 1996, and research activities and the publication of study results have been encouraged and formally included in the performance evaluations of academic staff. In 1999, the government launched BK21 (Brain Korea 21) initiative to promote research activities among university faculty and graduate students, to develop high quality curricula, to lead to structural changes in higher education institutions, and thus to nurture world class leaders for the 21st century. A total of US$ 1.2 billion is allocated for this initiative from 1999-2005.

Encouraging The Use Of Advanced Technology

The government believes that increased use of technology will achieve its aim of a more flexible and responsive higher education system. To promote research and development in the use of advanced technologies in education, the Ministry of Education and the Ministry of Information and Communication have provided special research funds. Although the promotion and use of technologies in education and research has been a national policy since 1988, it was not actively implemented until the establishment of the independent Bureau of Educational Information and Technology (BEIT) in 1996, the Korea Research and Information Center (KRIC) and Korea Multimedia Education Center (KMEC) in 1997.

The KRIC has used government funds to build a number of digital libraries using its own server and network system, to which all higher education institutions are now linked. As a result, education professionals across Korea now have access to online journals, research papers, databases and other academic materials. The KMEC supports the implementation of virtual education programs in primary and secondary schools and provides online teacher training. The KMEC also operates its own server system and has conducted a variety of multimedia-related activities, including researching the current use of technology in schools, implementing technology initiatives, developing online learning materials for teachers, students and parents, helping schools create their own homepages, and establishing and providing a comprehensive educational Internet service called EduNet. The two centers were united in April 1999 to create the Korea Education and Research Information Services. Other government initiatives include the Virtual University Trial Project, discussed in detail later.

With financial support from government and donations from private companies, all Korean colleges and universities are now connected to an online education and research network and provide accounts for students and staff. Since 1998, when the hardware system of higher education institutions was upgraded, increased emphasis has been placed on the use of technologies for education and research, and a videoconferencing system is now being used for communication among different campuses and to expand or make more efficient existing educational programs.

Universities and colleges have been attracted to information technologies (IT) because they believe that distance education and the use of IT in education provide a less expensive way of expanding access than conventional classroom teaching. However, high-quality distance education and the effective use of IT require careful planning and implementation strategies, systematic design and program development, and substantial student support.
Promoting Lifelong Education

While the funding allocated to lifelong learning programs in the past has represented less than 0.5% of total MOE expenditures, the government increased this to 1.1% in 1999 and plans to devote even more funds to distance education in the future. Although the Korea National Open University is still the only four-year, degree-granting distance learning university in the country, the revised Lifelong Education Law passed in 1999 now allows private institutions to establish similar degree-granting programs. The Higher Education Law will be amended to specify the necessary criteria.

Since 1997, individuals studying at accredited higher education institutions have been able to accumulate course credits in an account and apply them to appropriate certificates or degrees. This program, the National Credit Bank System, also accepts units earned in private and business sector programs and a range of other formal and non-formal institutions. In 1998, with an eye towards further qualitative improvements in lifelong education and training, OECD indicated the need to develop appropriate educational and training standards at the higher education level and in industrial training schemes to ensure the quality of the units earned through the Credit Bank System.

The number of lifelong education centers affiliated with four-year universities increased from 48 in 1993 to 116 in 1996. These centers create on-demand courses and employ experts from industry to provide practical courses to their students. Since the government initiated the Virtual University Trial Project in early 1998, more than 40 percent of higher education institutions have offered virtual education courses using the Internet, CD-ROM, cable TV or videoconferencing. About 25 percent of the institutions that offered virtual education courses in the fall of 1998 provided lifelong learning courses to adults and professionals.

These changes are direct responses to the increased social demand for access to higher education and lifelong learning, and also reflect: (i) the public’s continuous need for retraining; (ii) increased public demand for equitable access to higher education; (iii) increased competition for students among higher education institutions, which has driven them to provide more affordable and flexible programs of higher quality; (iv) an increased demand for technologically literate employees in the workplace; (v) increased incentives from the government to use the national information superhighway system to provide quality higher education services; and (vi) increased competition for financial support from the government.

Collaborating with Foreign Institutions

The Korean government has actively sought advice from external educational institutions and has encouraged higher education institutions in Korea to collaborate with each other and with more established distance learning universities and training centers in other countries. Joint research with professionals from these foreign institutions is encouraged and supported by the government.

For example, in the area of continuing engineering education the government has supported the formal observation and analysis of distance education models employed by Stanford University, the Massachusetts Institute of Technology (MIT) and the National Technological University (NTU). Some NTU programs have been used to train employees in several Korean companies, and some Korean higher learning institutions have collaborated with the World Trade Virtual University and the Western Governors' University. Korea National Open University maintains close relationships with the Open University of the United Kingdom and a number of open universities in other parts of the world, but specific collaborative measures — such as program and faculty exchanges, and credit transfers — have been taken rather slowly, principally due to language differences and Korean universities' lack of experience in collaboration.

The policies for higher education reform examined here are only the latest in a long series of measures aimed at improving the Korean tertiary system, but they are unique in at least two respects. First, Korea is at a crucial transition in its development and sees comprehensive reform of its education system as a critical step in educating its citizens in creativity and
leadership. Second, as the increasingly globalized economy is propelling Korea toward more open markets and deregulation, the technology revolution is creating greater pressure for the provision of learning opportunities for people of all ages. Higher education institutions must play a major role in meeting these economic and technological challenges.

Accordingly, Korea's education system has already made several big changes in response to the government's policies for flexible lifelong learning and to address social and economic challenges.

INNOVATIONS AT KOREA NATIONAL OPEN UNIVERSITY

As the use of IT in education and the rise of distance learning programs become more prevalent in the conventional universities, the Korea National Open University (KNOU) has been forced to implement new development strategies to remain competitive with them. The university has also faced new challenges as a result of Korea's economic crisis. This section examines the changes in KNOU's development priorities, IT strategies and funding approaches, and their impact on its ability to deliver quality distance education and lifelong learning programs.

Korea National Open University (formerly, the Korea Air and Correspondence University and Korea's first distance learning institution) was founded in 1972 as a branch of the Seoul National University. It initially offered a two-year junior college program through distance education mode to 30,000 students who were unable to attend traditional universities. The university became independent from the Seoul National University in 1981 when it began to offer a five-year university program serving 150,000 students. In 1992, it added the standard four-year program, and its enrollment increased to 300,000, amounting to roughly 11 percent of Korea's overall higher education enrollments.

KNOU offers instruction in 18 fields of study and now seeks to enhance the skills of professionals through post-graduate education. The percentage of KNOU students who have already attended other higher education institutions has been rising steadily in recent years; in 1999, more than 40 percent of new KNOU students already had a college certificate or a bachelor's degree.

KNOU currently serves more than 300,000 students nationwide and matriculates around 150,000 new students every year. It employs 670 full-time staff (including 176 academics), 2,670 part-time faculty, and 500 administrative employees. Thirteen regional study centers located in the larger provinces and 31 local study centers in small cities provide instruction sessions, individualized tutoring and other support services such as assistance with application forms. In addition to traditional face-to-face instruction, KNOU utilizes print, cable TV, radio, audio-cassettes, videoconferencing, the Internet and PC networks.

A typical three-credit course at KNOU uses a basic textbook, a series of twenty 30-minute video, radio or audiocassette programs, eight hours of either face-to-face instruction or lectures delivered via videoconferencing, one assignment, and a final examination. With an average of 1,000 students enrolled in each course and one professor assisted by a few part-time instructors, the course delivery system at KNOU is highly standardized. However, the minimal learning support which this implies has resulted in high dropout rates for first- and second-year students (Daniel, 1996); furthermore, in several courses, roughly 90 percent of students drop out during the first year due to dissatisfaction with program quality (Park, 1995).

Since increasing numbers of KNOU students are coming from conventional institutions where they experienced greater learner support and interaction, there is great pressure for KNOU to improve the quality of its services. KNOU has responded to this demand by introducing tutoring services, greater use of interactive technologies, and a course evaluation system in which students provide feedback on the course textbook, TV programs and other course materials and media.

At the government's request, KNOU began operating a cable TV channel in 1995. Although the annual operating cost of this channel absorbs 10 to 15 percent of the university's budget, only 8 percent of
KNOU’s students actually watch the programs, since the network does not reach all parts of the country, and program viewing is not required for course completion (Hong, 1998). This has raised concerns at KNOU regarding the cost effectiveness of using this expensive technology as a supplemental medium and the return on investment of new technologies in general.

KNOU has been hard hit by Korea’s economic crisis. Its total budget dropped from US$45.8 million in 1996 to US$42.8 million in 1999, and enrollments declined from 215,788 to 190,694 between 1996 and 1998 (table 3). Accordingly, KNOU has become extremely sensitive to cost issues, especially since 65 percent of its budget comes from student tuition (compared to only 30 to 40 percent for other public universities). As part of a drive to reverse the university’s declining enrollments and rising dropout rate, KNOU opened a public relations department to promote the university to prospective students. The university has also taken steps to improve cost effectiveness by implementing a project to measure the return on investment of various advanced technologies.

Table 3: Changes in KNOU’s Budget and Student Enrollment

<table>
<thead>
<tr>
<th>Year</th>
<th>Total budget (US$)</th>
<th># of registered students</th>
<th># of students on leave of absence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>45.8 million</td>
<td>215,788</td>
<td>110,909</td>
</tr>
<tr>
<td>1998/9</td>
<td>42.8 million</td>
<td>190,964</td>
<td>123,474</td>
</tr>
</tbody>
</table>

Technology Strategy

KNOU’s technology strategy seeks to provide more flexible programs for the university’s increasingly diverse student body, to improve overall quality of service, and to enhance communication between students and faculty. KNOU hopes to differentiate itself from conventional universities by being on the cutting edge in its use of advanced technologies for service delivery. Its major strategies are discussed in this section.

Development of an online database and multimedia digital library

Since its inception in 1992, KNOU’s text-based database has grown to include supplementary learning materials for more than 300 courses (60 percent of all courses offered by KNOU). Its collaboration with three nationwide PC network systems, also initiated in 1992, enhanced the university’s ability to provide services and materials to students nationwide and facilitate instantaneous student-teacher and student-student interaction as well.

With technical and financial help from IBM, KNOU established a multimedia digital library on the Internet in 1997. This initiative digitized and integrated all of KNOU’s TV, radio and cassette programs in 1998 to provide for full multimedia service delivery on the Web. The digital library system has two main functions: authoring and instruction. Using the authoring function, professors or instructional designers can create a standardized Web-based course, which integrates digitized KNOU TV or radio programs, graphics and text. The instruction function allows students to access the digital library from any place at any time via the Internet, watch the university’s TV or radio programs, read supplementary notes from professors and interact with professors. KNOU began adding its educational cable TV programs for lifelong education to the digital library system in 1999.

Increasing interaction through videoconferencing

As the result of a 1995 government-funded research project into possible uses of the information superhighway, KNOU has introduced an interactive videoconferencing network to enhance service delivery to all the university’s regional and local study centers nationwide. This initiative has connected 13 study centers with the main campus, has introduced interactive tutorial sessions, and has been used to facilitate meetings and open discussions among students, faculty members and general citizens in different parts of the country. The system has also been
used to deliver non-degree programs such as teacher training.

In 1998 this system, which uses a commercial T1 line, was used to deliver instruction for more than 74 of the 288 KNOU courses requiring eight hours of face-to-face instruction, cutting travel costs for KNOU professors and part-time lecturers who would otherwise have to provide face-to-face lectures in regional study centers. The new system has also cut costs for faculty and directors' meetings. Indeed, the videoconferencing system has proven to be one of the most successful uses of the national information superhighway as it has significantly enhanced interactivity among students, faculty and staff (Rha et al., 1996).

Using cable TV for lifelong education
KNOU's cable TV channel, the Open University Network (OUN), was founded in September 1996 and carries programming for students, related to KNOU's regular degree courses, and lifelong education courses for the general public. About 40 percent of OUN's broadcasting time is devoted to lifelong education courses, including such topics as electronic commerce, business management, the information society and education, Korean culture, using the Internet, and English language. OUN has also been transmitting on satellite TV since March 1999, allowing it, without a high increase in transmission costs, to reach remote areas, which do not have cable TV access.

Collaborating with other universities
In February 1998, KNOU joined the MOE's Virtual University Trial Project and the Korea Virtual University Consortium (KVU), under which KNOU and eight other universities collaborate in the design of Web-based virtual courses. KNOU provides consulting services to the faculty of the other eight universities in the areas of instructional design and the development and evaluation of Web-based courses; it also conducts staff development training seminars and allows the other member universities to use its production facilities and videoconferencing system. Over 2,000 students from KVU's member universities took virtual courses in 1998, and KVU began developing non-degree, lifelong learning virtual courses for non-students in 1999. Under the Virtual University Trial Project, KNOU students can now obtain credits for Web-based courses offered by other KVU universities as well.

Using an integrated Web-based support system to improve student services
In 1997, KNOU launched a self-financed upgrade of its 12 year-old computerized administration system. The new system includes databases of student and staff records, credit files, syllabi, and other administrative and educational records. Using the system, which is also linked to the database of online learning materials and library services, students may review their grades, apply for a transcript or certificate, download course materials, reserve books or articles in the library and even receive academic counseling online.

Financing And Costing Strategies

The Korean government, private corporations and KNOU itself finance KNOU technology and equipment. Between 1992 and 1994, KNOU received $250,000 from a commercial PC network company for the development of a PC network database and matched these funds with $250,000 of its own money. To generate the funds needed for database maintenance and revision, KNOU reduced the amount of printed materials provided to students, requiring them to print their own copies from the online database instead (Table 4).

Videoconferencing systems were established in 1995 with funds from the Ministry of Information and Communication (MIC) as part of the national information superhighway project. A total of US$1.6 million (with US$1.2 million coming from MIC and the rest from KNOU) was invested in equip-

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*A T1 line is a digital carrier of 1.544 mbps (megabytes per second) data range, or a general term for a digital carrier available for high-volume voice or data traffic and compressed video.*
Table 4: Contribution Source and Amount by Type of Technology

<table>
<thead>
<tr>
<th>Type of Tech</th>
<th>Funding Source (Date)</th>
<th>KNOU</th>
<th>Govt.</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC Network</td>
<td>1992</td>
<td>$150,000</td>
<td>0</td>
<td>$150,000</td>
</tr>
<tr>
<td></td>
<td>1993/94</td>
<td>$100,000</td>
<td>0</td>
<td>$100,000</td>
</tr>
<tr>
<td>Video conferencing</td>
<td>1995</td>
<td>$400,000</td>
<td>$1,200,000</td>
<td>0</td>
</tr>
</tbody>
</table>

The cost of providing instruction for a course of 1,000 students has proven to be significantly lower, since the implementation of the videoconferencing system — about $15,000 compared to $28,000 for the face-to-face instruction necessary without the system. In 1998, 74 courses used the videoconferencing system, leading to savings of US$1 million. These savings were then used to pay for the system's transmission fees and operational costs.

Increasing interactivity

Each of KNOU's 13 regional study centers has a computer lab with 20 to 30 computers. Each of these labs serves an average of 20,000 students, which translates to only one computer for every 1,000 students. Although KNOU reports about 120,000 connections per month, interactivity is much lower than expected. Possible reasons for this include the shortage of computers, slow feedback, inadequate facilitating skills on the part of instructors, and a student culture of passive involvement. One study, for example, showed that although most students use the PC network to download and exchange study materials, few students use it as a communications tool (Shin, 1999). And although half of KNOU's students access the computer network system from their homes or places of work, students using the network at home pay high telecommunications fees for slow connections, which discourages active involvement in online discussions.

Jung & Leem (1998) suggested that online communication could be increased by lower instructor-student ratios (20:1), providing facilitation training for instructors, and instituting requirements for greater online involvement. Still, cost is a major issue and all of these suggestions would increase costs for the university or the students. Other strategies which would not significantly increase costs could include: (i) providing standardized forms for online feedback; (ii) using student assistants who will voluntarily provide feedback to their peers; and (iii) organizing collaborative online learning teams where students can provide feedback to one another.

KNOU spends an average of US$13,000 to create and deliver a three-credit Web-based course to 30 students. This is relatively low compared to the costs incurred by other institutions, since KNOU is able to draw upon existing distance education materials, including CD-ROMs, printed textbooks, and video and audio clips stored in its digital library. A typical three-credit distance learning course for 1,000 students — consisting of a textbook, TV programs and face-to-face instruction — costs about $80,000 to produce and deliver, but this cost is much lower when radio is used instead of TV (see Table 5).

The average cost per student is significantly higher for Web-based courses than for other distance learning courses. The average cost per student for a 16-week Web-based course for 30 students is US$434, while the average cost per student for a traditional 16-week distance education course for 1,000 students is only US$80. Still, this vast difference in costs is offset by the fact that the dropout rate for KNOU's traditional distance education courses is around 60 percent, whereas the university's Web-based courses have dropout rates of less than 10 percent. Moreover, 70% of students taking Web-based courses have
Table 5: Cost Comparison: Standard Distance Education Courses versus Web-based Courses

<table>
<thead>
<tr>
<th>Delivery Mode</th>
<th>No. students</th>
<th>Cost to Produce &amp; Deliver</th>
<th>Cost per student</th>
<th>Dropout rate</th>
<th>Completion rate</th>
<th>Cost per completed student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard DE course (TV)</td>
<td>1,000</td>
<td>$80,000</td>
<td>$80</td>
<td>60%</td>
<td>40%</td>
<td>$200</td>
</tr>
<tr>
<td>Standard DE course (Radio)</td>
<td>1,000</td>
<td>$35,000</td>
<td>$35</td>
<td>60%</td>
<td>40%</td>
<td>$87.5</td>
</tr>
<tr>
<td>Web-based course</td>
<td>30</td>
<td>$13,000</td>
<td>$434</td>
<td>10%</td>
<td>90%</td>
<td>$482</td>
</tr>
</tbody>
</table>

expressed satisfaction in their course evaluations, citing in particular the interactive learning support they receive from online tutors and instructors.

These results suggest that KNOU's efforts to improve the interactivity and quality of distance education by introducing online technology have succeeded, but at high costs. To explore ways to reduce costs without diminishing quality, KNOU has launched a project to examine and compare the returns on investment for different distance education technologies. The results of this project will be used to formulate policy strategies to increase cost-effectiveness and accessibility. KNOU is also considering the possibility of introducing a differentiated tuition policy, based on the amount of learning support provided in each course.3

Providing low-cost lifelong education
KNOU's Center for Lifelong Education was established in 1997 and uses advanced technologies such as videoconferencing, cable TV, and the Internet to provide inservice teacher training, training for managers of small- and medium-sized businesses, Korean language education for foreigners and other professional training programs.

Many of these programs are developed and delivered in collaboration with external partners. Inservice teacher training programs are developed in collaboration with the Provincial Teacher Training Centers; TV programs to train top business managers are funded by the Small and Medium Business Training Promotion Center; and the Korean Language Association assists in the development of language education programs for foreigners. As the needs of these programs' target groups are identified in cooperation with relevant institutions, these programs have been very successful with most students and private sector partners because their content reflects the practical training needs of their audiences.

KNOU's success shows the potential of technologies to meet the diverse educational and training needs of the Korean people through the comparatively inexpensive distance education mode. Tuition for a 90-hour Korean language course at KNOU is $400, compared to $800 at conventional language institutions. A 60-hour distance learning course for top business managers costs $250 at KNOU, compared to $1000 elsewhere. KNOU's 60-hour teacher training course costs $60, compared to $80 at conventional training centers. These low costs, coupled with the flexibility that distance education provides to working professionals and Korea's geographically scattered population, have attracted growing numbers of students and has contributed

3KNOU students currently pay US$100 per semester, regardless of the number of courses they take or the types of media used in the courses. This is about 1/13 of the tuition in a public university and 1/20 of that in a private university.
to KNOU's strong reputation as a university for the working public.

**Seeking long-term cost-efficiency by improving self-directed learning skills**

As computer network technologies are introduced into distance education, students must develop stronger learning management and self-directed learning skills to compensate for the lack of direct contact with instructors. Through its experience in using these technologies, KNOU has learned that self-directed learning skills must be taught to help students manage their schedules, conduct research, engage in online discussions and regulate cognitive processes in an independent learning environment. As orientation sessions alone are not sufficient to help students acquire these skills, KNOU plans to offer a one- or two-credit course to help students develop these skills to reduce KNOU's high first-year dropout rate and to increase the cost efficiency of the distance learning system.

**EXPERIMENTING WITH ONLINE EDUCATION DELIVERY: THE VIRTUAL UNIVERSITY TRIAL PROJECT**

Until recently, KNOU was the only distance learning university in the country. But as Korea opened its education market to the rest of the world in the mid-1990s, several foreign education institutions — particularly from Canada, the United States, Australia and the United Kingdom — have begun to develop distance education programs for the Korean people, and increasing numbers of Korean students are now turning to these foreign universities.

In response to this challenge from foreign competitors, the Korean government and the country's higher education institutions saw the need to amend the Higher Education Law to permit Korea's higher education institutions and the private sector to establish degree-granting virtual universities using information and communications technology. Although the Higher Education Law allowed conventional universities and the private sector to offer virtual courses to their students and the public, KNOU is still the country's only single-mode, degree-granting distance learning university.

In 1998, the government established the two-year Virtual University Trial Project, which was designed to: (i) encourage partnerships and the sharing of existing resources among universities and the private sector; (ii) create a cost-effective virtual education system without diminishing quality; (iii) develop and implement Web-based courses or other types of distance education courses; (iv) identify appropriate policies and standards for running a virtual university; and (v) share experiences. During its two-year trial period, the MOE revised the Higher Education Law to accept private virtual universities as part of the formal higher education system. After this period ends in the year 2000 and detailed criteria for establishing a virtual university are specified in the Higher Education Law, Korea is expected to have several private distance learning or virtual universities which use advanced information and communications technology.

A total of 65 universities and five companies have participated in the Trial Project, resulting in the creation of 15 virtual entities (see Table 6). Eight of these universities joined independently, while the five companies and the other 57 universities formed seven consortia. The eight independent members each established a virtual campus within their own university systems, while each of the seven consortia established a virtual institution for their members to share. All 15 entities have implemented programs using various information and communication technologies (ICTs) such as satellite broadcasting, videoconferencing, video-on-demand, the Internet and Intranets.

**Objectives and Strategies**

The universities and companies participating in the Virtual University Trial Project have three principal objectives: reducing costs, differentiating themselves from other universities to attract more students and increase enrollments, and improving quality through increased interactivity. This section highlights some of the technology and financing strategies that project participants have developed to meet these objectives.
### Table 6: Participating Universities in the Virtual University Trial Project

<table>
<thead>
<tr>
<th>Participant's Name</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8 Conventional Universities</strong></td>
<td></td>
</tr>
<tr>
<td>1. Seoul National University provides Internet courses for students and learning programs for the public.</td>
<td>snuv.snu.ac.kr</td>
</tr>
<tr>
<td>2. Dongguk University established inter-disciplinary cyber program called the School of Cyber Creation.</td>
<td>cyber.dongguk.ac.kr</td>
</tr>
<tr>
<td>3. Sogang University provides virtual courses to its students and lifelong education courses to adults (including foreigners) using the Internet and satellite.</td>
<td>multinet.sogang.ac.kr</td>
</tr>
<tr>
<td>4. Gyungsang University provides Internet-based online courses to its students.</td>
<td>vu.gsnu.ac.kr</td>
</tr>
<tr>
<td>5. Chungnam University provides Internet-based online courses to its full- and part-time students and adults.</td>
<td>business.chungnam.ac.kr</td>
</tr>
<tr>
<td>6. Foreign Language University provides cyber foreign language courses using the Internet and synchronous technologies.</td>
<td><a href="http://www.hufs.ac.kr/cyber">www.hufs.ac.kr/cyber</a></td>
</tr>
<tr>
<td>7. Sookmyung Women's University provides retraining courses for professionals such as pharmacists and TESOL experts using the Internet.</td>
<td>snow.sookmyung.ac.kr</td>
</tr>
<tr>
<td>8. Yeungjin Community College provides practical courses to the community.</td>
<td><a href="http://www.yeungjin-c.ac.kr">www.yeungjin-c.ac.kr</a></td>
</tr>
<tr>
<td><strong>7 Consortia</strong></td>
<td></td>
</tr>
<tr>
<td>1. Korea Peninsular Virtual Campus is 5 conventional universities that formed a consortium to provide virtual programs on information technologies for adults</td>
<td><a href="http://www.inje.ac.kr/cyber">www.inje.ac.kr/cyber</a></td>
</tr>
<tr>
<td>2. Korea Virtual University Consortium is comprised of 8 conventional universities and KNOU, and provides virtual courses for member students.</td>
<td>kvc.chollian.net (<a href="http://www.knou.ac.kr">www.knou.ac.kr</a>)</td>
</tr>
<tr>
<td>3. Korea Online Virtual University is comprised of 4 conventional universities and provides practical courses for adults registered in the lifelong education centers of member universities.</td>
<td><a href="http://www.kovu.ac.kr">www.kovu.ac.kr</a></td>
</tr>
<tr>
<td>4. Korea Universities Virtual Education Consortium consists of 22 conventional universities and a newspaper company and provides virtual courses using satellite and the Internet to member students.</td>
<td><a href="http://www.chosun.com/class">www.chosun.com/class</a></td>
</tr>
<tr>
<td>5. Bool Virtual University consists of 4 conventional universities in the Southern region of Korea and provides graduate degree programs for member students, teachers and public officers.</td>
<td>bool.rit.ac.kr</td>
</tr>
<tr>
<td>6. Open Cyber University consists of 12 universities, a newspaper company and a network systems integration company. It provides Internet courses for students of member universities and lifelong programs for the public.</td>
<td><a href="http://www.ocu.ac.kr">www.ocu.ac.kr</a></td>
</tr>
<tr>
<td>7. Seoul Cyber Design University consists of 2 universities that specialize in art design and provides cyber art design courses for member students.</td>
<td>cyber.hongik.ac.kr</td>
</tr>
</tbody>
</table>
Three major strategies have been found to help reduce costs for institutions offering virtual education programs: maximizing the use of existing technologies, sharing physical and human resources, and private financing. Since the institutions participating in the Virtual University Trial Project received no initial funding from the government, they all had to provide their own grants to establish the virtual programs. To minimize investments, these institutions used existing hardware and network systems, and most formed a consortium to share costs and resources. In line with the national technology implementation policy for higher education, most colleges and universities have also established a solid server system and are linked to the national educational computer network or the national information superhighway.

Some universities have established videoconferencing systems and are using satellite channels to deliver courses. Collaborative development of virtual courses and team teaching among professors from member institutions is encouraged, although these types of collaboration have been limited so far because there is little or no systematic support for this type of collaboration or simply because professors prefer to work independently. Production facilities and computer and network systems (including those of private companies) are shared extensively, however.

Although the government provided no direct financial support to participating institutions at the beginning of the Trial Project, it did give extra points when determining its budget allocations to institutions experimenting with new technology applications. Most institutions charged its students tuition rates ranging between $40 and $50 per credit, much lower than the average $80 charged for conventional courses. This low tuition policy—which is based on the assumption that even though virtual programs are expensive to develop, they are more cost-effective in the long run—is aimed at attracting more people to virtual programs.

As a result of Korea's recent economic crisis, higher education institutions have suffered the effects of financial cutbacks in government support and a sharp decrease in student enrollments, resulting in drastically lower income from student fees. Private colleges and universities have been the hardest hit, as more than 70 percent of their budget is derived from student fees. This shortfall has been further compounded by the fact that an increasing number of Korean students are beginning to take virtual courses offered by foreign higher education institutions.

As higher education institutions must now scramble to compete for new students and retain those already enrolled, the cost effectiveness of virtual education makes this and other programs involving advanced technologies more attractive. Attracting students in today's competitive market, however, requires more than just advanced technology and differentiation. The quality of educational services must be very high, and online technology must continue to improve the level and quality of interactivity, which has often been poor in conventional classroom-taught courses.

In most conventional universities, one of the biggest challenges to the use of educational technologies is resistance of the academic staff. Many academics believe that technology is useful only for information transmission, but that human contact during class is essential for building higher-level knowledge. Most institutions have sought to improve the quality of courses by providing training, adopting a concept of instructional systems design, and setting up monitoring mechanisms. But unfortunately, only a few institutions have recognized that quality virtual education requires an instructional systems approach with well-connected components to help students experience meaningful online learning.

To help academics better understand the nature and benefits of virtual education and thus help them build effective virtual course design skills, most of the Trial Project's participating institutions have provided training that emphasizes the effectiveness of virtual education. Some have gone a step further, providing faculty with on-demand technical assistance and continuous training in the design and management of virtual courses.

In 1999, however, the Korean government granted $500,000 to those institutions deemed to have provided high quality virtual programs with strong reputations.
Some educators are concerned that new technologies are not being used in the best possible way. Some instructors, for example, see network technology more as a means of overloading students with reading materials and database links than as a tool to promote interaction. In other cases, expensive multimedia materials went unused because they exceeded the capacities of the student hardware and network environments needed to operate them. Most institutions had not considered beforehand where and how technology should or can be applied to reduce costs, differentiate their university from its competitors, and improve quality.

The Virtual University Trial Project has encouraged Korean companies to develop software, and several have created successful virtual education platforms or distributed learning systems for authoring, implementing and managing virtual courses. At least six of these platforms are now available and some companies have begun to develop Web-based training programs to be delivered through one of the Trial Project's participants.

Project Implementation in Sample Cases

The Virtual University Trial Project has led 25 percent of Korea's higher education institutions to collaborate with each other and the private sector in the provision of virtual courses and the incorporation of distance education in their campus-based systems. As of February 1999, eight Trial Project participants had developed and delivered online courses, and 60 percent of the 15 project participants had created a special team or administrative division to manage their participation in the program.

This section will examine case studies from three Trial Project programs. The first explains how a consortium consisting of conventional universities, a newspaper company, and a network systems integration company divided their roles in the Virtual University Trial Project and created a management and quality-control system. The second case shows how a conventional private university established a virtual campus system and differentiated its virtual programs and financing strategy from other institutions participating in the Trial Project. The final case highlights the ways that Korea's most prestigious national university integrated virtual programs into its educational system to offer more choices to its students and to open its educational services to the public at large.

Open Cyber University

The Open Cyber University (OCU) is an example of a virtual university with an efficient organizing body. The management system of this consortium is similar to those found at the Western Governors' University or the National Technological University in the United States. The consortium was officially founded in October 1997 and consists of 12 conventional universities, a newspaper company and Samsung Data Systems, a network systems integration company. The consortium's universities provide content and design virtual courses, while Samsung Data Systems provides the hardware and technical skills needed to develop and deliver the courses, and the newspaper company provides advertising. All 14 consortium members share the costs of running the university through their payment of annual membership fees.

OCU offers degree programs to students of its member universities and non-degree and certificate programs to non-members. No extra tuition is required of students from member universities, but external candidates are required to pay tuition of $40 per credit hour. OCU began operations by creating a virtual university council made up of representatives from its member institutions to determine policies. The next step was to create a management team consisting of a project manager, computer operators, programmers, instructional designers and media specialists to develop and deliver virtual programs. A planning and evaluation team was formed to identify the needs of the target audience, to suggest courses for meeting identified needs, to evaluate courses and to make recommendations for improvement. When evaluating courses, the team considers the number of enrolled students, course completion rates, responses from the students, and comments from outside instructional designers.

Delivery and communication strategies include Web-based instruction, real-time interactive education, asymmetric satellite course delivery and off-line CD-ROM-based instruction. Most undergraduate degree
courses for students from member universities require little or no human contact since the students already interact with professors from their other courses on a regular basis. Non-degree courses for lifelong learners, on the other hand, provide more face-to-face tutoring or real-time interaction based on the assumption that those outside the formal education system require more direct and more frequent learner support. In the first quarter of 1998, OCU's virtual courses enrolled 914 students from its member universities and 122 adults from outside its student population. More than 90 percent of those who enrolled went on to complete the courses.

OCU also collaborates with other virtual universities outside Korea — including the World Trade University run by the World Trade Association and the National Technological University, which offers courses for practicing engineers — although there have been no concrete exchanges of programs or staff members so far. OCU would ultimately like to operate as an independent, for-profit virtual university and has actively urged the Korean government to amend the Lifelong Education and Higher Education Laws to permit the operation of private distance learning universities. Even though the private sector has played a significant role in education by sharing the burden of its cost, education has never been considered a commercial industry or a commodity in Korea. Recent changes in the global economy have changed this view, however, by directly linking professionalism and commercialism to education. The Korean government is expected to adapt to this change by permitting the establishment of for-profit virtual universities in its education laws in the near future.

Sookmyung Cyber Education Center
The Cyber Education Center of Sookmyung Women's University was established in May 1998 and offers virtual programs only for working professionals. In addition to offering virtual courses, the Center disseminates electronic information, establishes professional databases and provides a digital cyber-library.

In 1998, the Center enrolled 430 students in virtual programs for pharmacists, general English experts, experts in teaching English as a second language and music teachers. In 1999, the Center enrolled 550 students and added other virtual programs for child education experts, nutrition counselors and virtual education specialists. After the expiration of the Trial Project, the Center will assume the new name of Sookmyung Cyber Campus and will continue to develop and provide virtual inservice courses and create graduate degree programs for professionals.

To ensure the quality of its programs, the Center formed a course development team consisting of an instructional design expert, a programmer, a media expert, a graphic designer and an administrative staff member. Content experts — often-famous scholars or practitioners — are invited from within and outside the university. In four to six months, the course development team analyzes learners' needs, designs the course and produces Web-based instruction. The university video and audio production team develops video and audio materials and digitizes them for integration into the course.

Since it expends comparatively high amounts to develop its virtual courses and since its target audience is composed chiefly of adult professionals, the Center charges high tuition rates. An average 16-week course costs $1,000, and programs cost even more. Sookmyung Cyber Education Center's tuition policy is unusual, with fees running six to seven times higher than any other virtual program offered by higher education institutions. The Center's justification for these higher rates is that it develops practical courses for professionals who are willing to pay more for flexible, open and on-demand learning. By differentiating its programs from other institutions and targeting only busy professionals, Sookmyung Cyber Education Center receives more of its income from private student fees and is able to invest more in developing high-quality virtual programs.

Seoul National University Virtual Campus
Several years ago, Seoul National University — Korea's most respected conventional university — provided distance education programs to working engineers via interactive videoconferencing. These non-degree programs were intended to supplement the engineers' field experience with information regarding recent innovations in engineering.
Using this experience, Seoul National University (SNU) has created a virtual campus that provides Web-based credit courses for both its own students and students from other universities. Non-SNU students may take courses at their own schools or from home. Fourteen Web-based virtual courses were created for SNU students in 1998 and twenty more were offered on the Internet in 1999. Non-credit courses are also available. In 1998, over 500 students took virtual courses, which use the Web and are supplemented by face-to-face tutoring. The university has organized a virtual campus team, which provides staff development programs for faculty and helps the faculty develop and deliver virtual courses.

SNU also offers its conventional courses in virtual formats to increase access to courses, which are high in demand. The faculty who teach the conventional courses are responsible for content, course design and course delivery, and are usually assisted by a graduate student paid by the university. No extra fees are charged to SNU students for virtual courses, and non-credit lifelong education programs are free as well. SNU's main objective is to expand access to existing courses and to provide an alternative method of conventional face-to-face instruction, unlike OCU and Sookmyung, which focus more on providing virtual programs to adult professionals for profit.

Outcomes

The Virtual University Trial Project has increased collaboration among colleges, universities and companies. Despite their lack of prior experience in such collaboration, many of these institutions have developed highly successful virtual programs and have entered into formal relationships with foreign universities.

An informal report conducted by KNOU in 1999 found that four of the 15 Trial Project participants' programs are not well managed (Jung, 1999). The five participants whose programs were found to be excellently managed were those with effective systems for staff training and continuous technical assistance. Most participating institutions, however, still do not fully recognize the importance of systemic design approaches in which instructional designers, faculty members and technicians work together as a team. Most participants lack adequate monitoring and evaluation systems as well.

Several evaluation studies were conducted by Trial Project participants in 1998 and 1999 to use student feedback to develop more effective online teaching strategies.

According to a preliminary survey conducted by the Education Research Center of Seoul National University in 1998, about 85 percent of the students enrolled in virtual courses used the network's computer labs. More than half of these students declared themselves satisfied with the university's physical and technological infrastructure, although 30 percent complained of slow network speed. Overall, students were satisfied with the flexibility offered by virtual courses and said they would like to see more virtual offerings in the future — particularly if developed in collaboration with other Korean universities or foreign universities. Further development of SNU's digital library was identified as the most important priority for further action. Other recommendations included greater collaboration with industry and more focus on lifelong learning for the general public.

KNOU polled 136 students who had taken one of its online courses in the second semester of 1998 and found that although 70 percent were satisfied, many felt that KNOU had not provided sufficient learner support in its traditional distance education courses (those using print, radio or TV), mainly due to the huge number of students and the lack of tutors in regional centers. Eighty percent of students surveyed reported unintended learning outcomes in terms of improved knowledge and skills in the area of data analysis, Internet use, and self-directed learning skills, indicating that online courses can have positive effects on IT literacy.

More than 70 percent of respondents indicated that, although they had received support from online tutors and instructors, there were often substantial delays. More than 60 percent of the students who participated in online discussions reported that the topics were not concrete enough to actively engage participants; little useful information and few refer-
ences were provided to guide constructive discussions, and online discussion teams were not well organized. Many students also reported getting lost on the Internet due to inadequate icon design, excessive use of multimedia and graphics, and too much required reading or other online activities.

Student recommendations included: (i) installing high-speed Internet facilities in KNOU's regional study centers for use by students without access to high-speed LAN systems, (ii) providing orientation and training for instructors, online tutors and students to help the students use the Internet more effectively, (iii) implementing systems for continuous monitoring and evaluation, and (iv) implementing various cost-cutting measures, such as combining the Internet with textbooks and other less expensive media and decreasing the number of instructors through greater peer collaboration.

VIRTUAL TEACHER TRAINING

Teachers are one important group of professionals for whom lifelong learning opportunities are crucial especially in the area of ICT. It is essential for Korean primary and secondary students to acquire skills in the new technologies, and in order to accomplish this, the teaching force must have continual access to training and upgrading. Although virtual education is still not the most prevalent method for inservice teacher education, several teacher training centers in Korea have used the PC network as a supplementary tool for the distribution of learning materials and to encourage interaction between trainers and trainees. The government has also supported major initiatives to support the development and launch of Internet-based teacher education programs.

This section will examine the goals of the introduction of virtual education for inservice teacher training, and the strategies that have been employed to achieve them.

In 1987, the government began the large-scale introduction of computers in primary and secondary schools. With financial support from Korea Telecom, the Ministry of Education invested about US$53 million to establish computer systems and networks in schools between 1989 and 1996. By 1996 every school in Korea was equipped with an average of 33 computers, and in 1997 the government initiated a comprehensive six-year strategic plan to establish an advanced educational infrastructure. Since then, the MOE has made major efforts to place two multimedia computer labs in each school, to establish a multimedia network in each classroom and to provide a computer for every teacher. By 1997 there were about three teachers and slightly over 20 students per computer in primary and secondary schools. 2002 will reduce that ratio to one computer per teacher.

The Ministry of Education and the Provincial Offices of Education have provided inservice teacher training in the use of educational technologies in the classroom since 1988, and by 1998 all primary and secondary teachers received between 30 and 180 hours of training in ICT. The training focus in the early years was on understanding computer technology, acquiring programming skills and developing computer-assisted instruction. Later, the focus shifted to emphasize the educational use of computers and the network systems in school. This training was conducted mostly in large groups, however, with limited time for hands-on practice.

Many of the teachers who received this training reported a lack of confidence about introducing computers and the Internet in their classrooms, as most of their training time was spent in downloading information and not enough was spent on practice (KMEC, 1998a). There is some evidence, though, that the introduction of online teacher inservice education has had a positive effect on their use of educational technologies in the classroom.

By the end of 1997, about 20 percent of Korean schools had established LAN systems and were linked to the Internet. To respond to schools' concerns regarding the high cost of Internet connections, in 1998 the government introduced a line item in the budget to cover the cost of these fees, either by paying a one-time, up-front charge for a dedicated line or by covering a portion of a school's telephone bill. More than half of all schools subscribe to text-based PC online services provided by local or national PC network companies, although many are switching
to full Internet access. By the end of 2002, all Korean schools will have high-speed Internet connections. Administrators and teachers have also begun advocating online teacher training or distance education training using advanced technologies already available in schools and training centers.

Each of the 16 Provincial Offices of Education collaborates with nearby colleges and universities to provide inservice programs. Several of the centers adopted the text-based PC network as a teaching and communication tool to complement other conventional training methods. This required little investment since the network companies conducted the initial development of text-based training materials, and the technology was already in the schools.

Nine teacher training centers have used the PC network to distribute text-based course materials, to announce important messages, to allow participants to interact with others on specific issues and to encourage interaction between trainers and learners in 79 general and specialized training courses. Although the network has been used only as a supplement to conventional teacher training in most of the online programs, little teacher tutorial support was provided. Some courses use the PC network as their principal training medium, however, and are able to offer greater interactivity with course instructors.

Teacher training centers have been using the text-based PC network because it is fast, cheap and utilizes the schools’ existing computer and network infrastructure. Until recently, however, most centers have ignored the fact that schools usually have only a few telephone lines for all staff members and cannot assign separate lines for teacher training. As a result, even though schools had computer and network systems which could be used for online training, those systems were not fully used because of high transmission fees and lack of telephone lines.

Only a limited number of schools that have connections to dedicated high-speed educational network systems encourage their teachers to use the school infrastructure for online training. Most schools actually request that teachers use the school network only for administrative and instructional purposes, and ask that teachers use the PC network from their homes to download training materials and to communicate with other teacher trainees. Teachers have, therefore, become relatively heavy users of the PC network from home and are now the second largest group of network users.

A lesson to be learned from this experience is that financial support must be secured for both telephone lines and transmission costs to maximize the use of the school network system. Fortunately, the Korean government began to provide funds for school transmission fees in 1998, offering US$1 million the first year and increasing this to US$3.4 million dollars in 1999 (MOE & KMEC, 1998).

A recent evaluation of inservice teacher training reported that as Internet use grows and expands in schools, there will be a growing need for flexible teacher training in the use of this technology and for quality training programs that allow the active involvement of teachers in their own learning (KMEC, 1998a). This evaluation noted that most teacher training programs are delivered in large classrooms with little interaction between instructors and teachers. To meet the need for more flexible and interactive teacher training, in the summer of 1997 the MOE and the MIC jointly funded a project to create the Cyber Teacher Training Center (CTTC) within the KMEC. This project developed a software platform for managing virtual teacher training and 11 general education courses, with more courses to be added each year. These courses, now available through KMEC’s EduNet, include “Computers and the Information Society,” “Educational Reform,” “Future Society and Education,” and “Environment and Education.”

Most of the virtual training courses offered by CTTC are developed as self-directed Web-based learning programs, lasting anywhere from a few hours to several months. The facilitator of each course is encouraged to provide online support and motivation to teachers, give them task-oriented feedback and evaluate their performance. Group discussions are also

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5 Until 1998, schools were required to pay transmission fees as well.
encouraged among learners, with some courses requiring participation in one or two face-to-face tutoring sessions. Although learners are sometimes evaluated on the basis of their participation in online discussions and are required to submit a report, most courses include a final examination administered in a classroom setting.

Training centers in provincial education offices are encouraged to use CTTC’s virtual programs free of charge, to revise them to meet their own purposes, to add other learning support services, and to provide the programs to teachers within their respective provinces. Since early 1999, three provincial offices and the Korea National University of Education have used these virtual programs, and more centers are expected to use them in the future.

A formative evaluation conducted by KMEC in 1998 to test CTTC’s management platform and solicit learner feedback found that:

- Fifty-four percent of the 680 teachers surveyed were satisfied with their online training courses; many of those who were dissatisfied complained of inadequate instructional design, which made it difficult to use features such as online conferencing, e-mail and hyperlinks to other databases. More than 70 percent indicated that they preferred virtual training to conventional methods because of its flexibility.

- Approximately 43 percent of teachers surveyed accessed the Internet from their schools, and 42 percent from the computer lab of the Provincial Office of Education or the KMEC, to take advantage of these facilities’ high-speed connections and to avoid transmission fees. Only 15 percent studied at home.

- Most teachers were not satisfied with the method of testing in their virtual training courses, and found it inappropriate to administer tests for virtual courses in a regular classroom. Many suggested an online test instead.

- Many respondents complained of a lack of interaction between instructors and teachers and among teachers, primarily due to instructors’ limited time and the lack of online facilitation skills.

- Most of the instructors in the virtual training courses were busy, well-known scholars who were unavailable to provide frequent learning support. Delayed responses (or none at all) to trainees’ questions was cited as one of the biggest shortcomings.

- Most instructors were found to lack the necessary skills to facilitate online interaction, thus failing to provide the interactive learning environments needed to stimulate active learner-to-learner interaction.

These results show the possibilities of Internet-based courses in the provision of a flexible learning environment, but also suggest several areas for improvement. First, it is important to integrate instructional design considerations into the development and implementation of virtual training courses. Second, early training sessions must be provided for instructors to help them acquire effective online facilitating skills. And third, high-speed connectivity is essential for promoting active use of the Internet in both teaching and learning.

These points were confirmed by another study, conducted by Jung and Choi in 1999, which looked at two virtual training courses in the private sector. This study identified several factors that affect the educational effectiveness of online courses. In particular, it was found that good design strategies which incorporate different Internet features and encourage active interaction with instructors and other learners in an organized way have a direct impact on the quality of online courses and lead to greater learning, higher levels of satisfaction and stronger gains in IT literacy.

Some findings suggest that virtual teacher training has had a positive impact on teachers’ computer literacy. Many teachers who used the local PC network for training later joined online teachers’ clubs in which they exchanged ideas and materials with other teachers and used online materials for their teaching. Thus, it appears that most teachers who have participated in online training continue to use...
the network for other purposes as well. Furthermore, teachers who have participated in virtual training programs have become leaders in their schools in the implementation of new technologies more actively than teachers who have not participated in these programs. And finally, those who have taken a virtual course in the past tend to enroll in other virtual courses and to perform better in these courses than novice users (Jung & Choi, 1999). In general, computer literacy skills obtained during virtual training tend to be applied to the next level of training.

KMEC (now known as Korea Education and Research Information Services) provides a common platform for developing and managing virtual teacher training courses, along with a sample of courses that can be easily revised and integrated into other training activities by individual training centers. Virtual courses developed by training centers can then be linked to KMEC’s EduNet and shared with other training centers. Although there is no concrete data at this stage that compares the relative cost-benefit of virtual training to conventional teacher training, sharing training programs among training centers is likely to reduce training costs in the long run.

However, an internal evaluation report prepared by the Distance Education Team of Korea’s Samsung Human Resources Development Center recommends a number of strategies for reducing training costs using the Internet. According to this report, if an Internet-based training course is used twice a year for three years, with at least 400 trainees per year, then the cost of virtual training courses would be reduced to only 10 to 15 percent of the costs of their conventional counterparts. In 1998, Samsung provided 28 web-based training programs four times a year, to more than 3,500 employees each time, and spent only 9% of the costs of the face-to-face counterpart courses (Oh, 1999).

During the implementation of some of the virtual teacher training programs, several barriers were recognized at the policy level that must be removed. These barriers include requirements regarding classroom attendance and the use of a norm-referenced grading system. For example, the current norm-referenced grading system established for certain training classes consisting of 50 trainees, may not be suitable when that same course is later delivered to several hundred trainees. In fact, many educators have criticized the norm-referenced test because it has not provided adequate evidence that each trainee has met course objectives and achieved adequate improvement in teaching performance. A criterion-referenced grading system must be integrated into the current evaluation system for virtual inservice courses, since the teachers are encouraged to develop their own learning objectives and to select course content based on these individual objectives.

The evaluation studies also indicated that the government should provide incentives for teacher training institutions to restructure their programs and to include online teaching as part of their future initiatives. The government was expected to revise its teacher training policies in 1999 to reflect these considerations and to permit various forms of virtual education in teacher training. However, due to changes in leadership and other positions in the MOE, and extended hearings from teachers’ unions, this revision in policies has yet to be made.

In summary, virtual teacher training is seen to have several benefits: (i) teachers can access training without leaving their classrooms, (ii) teachers can improve their computer literacy, (iii) teachers are better able to interact with their trainers and other teachers online, and (iv) once a “bank” of online courses has been developed, teachers can access those courses that meet their individual needs. Online teacher training is also believed to be more cost-effective and efficient, although sufficient data to support this is not yet available.

DESIGN AND COST ISSUES IN VIRTUAL EDUCATION

Even though no single type of technology has been proven superior over the others, the evidence shows that interactive technologies are more effective than traditional one-way technologies such as radio or television in covering certain elements of course curricula, such as simulations, collaborative learning and problem solving (Harasim et al, 1995; Hiltz, 1995; Romiszowski & de Hass, 1989). Multi-channel instruction has been shown to improve instructional
effectiveness compared to single-channel instruction. Considering the interactive and multi-media characteristics of current ICTs, advanced technologies have the potential to significantly improve the effectiveness of teaching and learning.

Importance Of Instructional Design

However, without careful instructional design, appropriate learner support services and continuous staff development and evaluation, the potential benefits of ICTs may not be realized. Many studies show that virtual education can produce learning outcomes equal or greater to those of conventional, face-to-face education only if it employs appropriate techniques and skills in the design and implementation of its technology-mediated learning programs (Verduin & Clark, 1991; Carter, 1996; Thompson, 1996; Russell, 1998; Jung & Choi, 1999).

While Korea has identified some key strategies for improving the quality of virtual education, it must continue to explore more sophisticated means of improving the quality and effectiveness of these programs. Future studies should address the following questions:

- Instructional strategies: What are the most effective design strategies for helping learners maintain and manage their learning goals and processes while browsing through online resources?
- Strategies for active involvement: How can we enable learners to more actively process information and construct meaningful knowledge?
- Motivational strategies: How can virtual education motivate the learner?
- Strategies for guidance and feedback: What are the most effective and efficient means of providing guidance and feedback to learners during the learning process?
- Testing strategies: What are the most effective testing strategies in virtual education to ensure that learners have integrated the relevant knowledge and skills?

Some of these issues have already been explored. For example, in comparing two different instructional design strategies for Web-based training courses for corporate employees in Korea, Jung & Leem (1999) reported that a Web-based course, which adopted design strategies to provide specific guidelines to self-directed learning, appeared to be more effective than a course that provided a more open-paced, problem-based learning environment. The first Web-based course presented content in small chunks, provided specific guidelines to help learners manage their everyday learning schedule and offered opportunities for self-examination through various types of checklists. The course’s completion rate was 93.4 percent, with an average final grade of 85 (out of a possible 100 points). In the other course, each learner was asked to solve authentic problems using various online resources, and students later collaborated with other learners to improve individual solutions. The completion rate for that course was 72 percent, with an average final grade of 62, suggesting that a course that required active online discussion and individual research without specific guidelines was somewhat inappropriate in a corporate training course in Korea.

Yet another example is a study that explored motivational strategies for virtual education. Gunawardena & Zittle (1997) reported that “social presence” — the degree to which a person is perceived as a real person in the technology-mediated learning environment — was a strong predictor of learner satisfaction and motivation.

Little empirical research has been conducted to explore the effects of specific design strategies on students’ learning and motivation. Future research should examine effective design strategies to develop quality virtual education courses in a variety of learning contexts.

Cost Effectiveness

Cost reduction is frequently cited as one of the objectives to be met through the introduction of ICT in education. Declining ICT costs have made computer-aided and online instruction increasingly feasible, and these cost savings are even greater now than in the past (Wolff, 1999). Nonetheless, costs
are still significant in most countries and investment tradeoffs must be considered.

Cost-effectiveness studies comparing various technologies also have been carried out. Early studies on videoconferencing indicated substantial cost benefits (Showalter, 1983; Hosley & Randolph, 1993; Trevor-Deutsch & Baker, 1997) and increased productivity by providing training directly to the workplace (Thompson, 1994). Even though its costs were higher than those of other classroom-based programs, interactive satellite-delivered training courses were found to be cost-effective due to their higher enrollments, increased student access to quality programs and resources, and other benefits (Ludlow, 1994).

Hall (1997) compared CD-ROM-based training to classroom-based training in a high-tech company and found that over the program's three-year pilot period, costs for the CD-ROM-based course were 47 percent lower than those for classroom-based courses. In addition, the CD-ROM-based course's improved instructional design, variety of instructional models and other strategies contributed to more effective learning and reduced training time.

A recent study on the cost-benefit of Web-based training reveals that Web-based training has higher fixed costs than conventional face-to-face training. However, those costs are offset by lower variable costs in course delivery due to the reduction in delivery time and the increase in student enrollments (Whalen & Wright, 1999). While these studies are useful for identifying and comparing the costs and benefits of technology-mediated courses, no specific research has been conducted to assess the cost effectiveness of Web-based virtual courses and to address the question: Is the educational outcome of virtual learning worth the cost?

To answer this question, more reliable empirical data are needed. Some specific questions for future studies on cost effectiveness include:

- Does standardization of the virtual program format reduce costs without diminishing the quality of education and/or decreasing online interactions?
- To what degree can online resource sharing improve the cost effectiveness of virtual education? How do different design strategies affect cost effectiveness?
- What are possible ways to improve cost effectiveness while maintaining high levels of interactivity?
- How can economies of scale be achieved in specific contexts?
- How often must virtual education courses be updated or revised to maximize cost effectiveness?

The increased number of ICT options available today means more opportunities than ever before in the area of distance education. Online virtual education programs create possibilities that might otherwise not exist by overcoming cost, time and location constraints, particularly for working adults. Even traditional institutions that have never provided distance education courses can now use ICTs to increase the flexibility and openness of their programs. But even though most agree that advanced technologies have made education and training more flexible and open, many learners are still unable to access these technologies, and there is a growing fear that the gap between the “haves” and the “have-nots” is only widening. We must therefore develop practical strategies to remove or lessen the disparity of access and improve the cost effectiveness of virtual education.

**RECOMMENDATIONS**

As a result of the exponential growth in information and communications technology, many new forms of educational media have become available. Virtual education media eliminate the spatial limitations and time constraints of more conventional education methods, removing the need for the learner to be present at an instructional site at a designated time. This unique characteristic of information and communications technology has the potential to make education and training more effective, affordable and flexible if used properly.
The government of Korea has placed a high priority on improving the reach and effectiveness of its tertiary system through experimentation with advanced technologies. Its higher education institutions have responded with bold experiments in the use of virtual education and training, and this experience suggests several strategies for improving the quality of virtual education, reducing costs without diminishing quality and promoting more widespread use of virtual education. Major strategies for improving the quality of virtual education at the higher level include:

- providing support and professional development for online educators;
- applying a systems approach and constructivism to program design;
- building a monitoring and evaluation system; and
- providing organized student training for self-directed learning.

Strategies for reducing costs without diminishing quality include:

- network integration;
- sharing online databases with other organizations; and
- forming partnerships and alliances with other institutions inside and outside of Korea.

Strategies for promoting virtual education include:

- adopting costs for internet connectivity;
- providing appropriate and adequate legal and policy foundations; and
- providing a variety of personal incentives, if needed.

Each of these strategies is explained in more detail below.

**Improving Quality**

**Faculty support and development**

The Korean experience reveals the importance of establishing a support system that provides continuous professional development and technical assistance to academic staff to ensure the quality of virtual education. As participants found when implementing the Virtual University Trial Project, successful implementation requires academic staff to be skilled in instructional design and learning, online facilitating, promoting on- and off-line interaction, and providing for learner evaluation. These skills are often very different from those required in conventional teaching.

Reluctance of faculty has been found by several studies to be the major force undermining the development of virtual education (Farrell, 1999; Romiszowski & de Hass, 1989; Kaye, 1990; Paulsen, 1995; Berge, 1996). In these studies, instructors’ facilitating skills and positive attitudes towards online teaching and learning were found to be the most important factors affecting the success of online courses and learner satisfaction levels.

Ongoing workshops can be a useful way to allow faculty to discuss problems and find solutions in the process of virtual education program design and implementation, and may be supplemented with input from computer engineers, programmers, instructional designers and online instructors. Online instructors should be trained as mentors or facilitators rather than mere transmitters of information. Teacher support systems should also include assistance for online course production and on-demand technical assistance.

**Applying a systems approach and constructivism to program design**

The Korean experience in inservice teacher training and the Virtual University Trial Project confirms that merely introducing advanced technologies or hiring famous content experts to deliver virtual courses does not necessarily guarantee the quality of educational
services. Specific needs and capacity must be taken into account, and technologies must be used to keep students actively engaged and to encourage and enable them to interact with each other and with course instructors.

Instructional Systems Design (ISD) models can guide virtual educators through the step-by-step development and implementation of effective virtual education programs. The steps of this model are: (i) identifying learners' specific needs; (ii) developing concrete instructional objectives based on these needs; (iii) selecting and organizing content according to learning objectives; (iv) developing and implementing online teaching strategies to promote active learner involvement in the virtual learning process; and (v) evaluating the effectiveness of virtual education.

Constructivism provides another important approach to effective instructional design (Jonassen, 1988; Bonk & Cunningham, 1998). Using the technologies at hand, learners should be given opportunities to actively manipulate the information and tools they are given, to integrate new ideas with prior knowledge to build their own meaning and to work with others in learning and knowledge-building communities. Constructivist principles provide design guidelines for the creation of online learning environments that support learners' efforts to actively engage in the learning process, articulate cognitive goals and construct meaning in collaboration with other learners. Several empirical studies confirm that these strategies help learners to actively engage in the construction of knowledge, form a virtual learning community, articulate what they are doing, and develop team responsibility (Bruckman, 1996; Shaw, 1996; Bonk & King, 1998; Ward & Teissen, 1997).

Building a monitoring and evaluation system
The Virtual University Trial Project highlights the importance of systematic monitoring and evaluation. Institutions that employ a regular system of monitoring and evaluation are able to identify the strengths and weaknesses of virtual programs and revise programs and policies accordingly.

At least one researcher should be hired to conduct monitoring and evaluation. The major points of research to be carried out include conducting a formative evaluation during the design and development process, monitoring the electronic logs of network use and teaching-learning processes, and assessing the direct and indirect effects of virtual programs on individual learners, faculty members or trainers, and teaching organizations.

Provide organized student training for self-directed learning
KNOU's 27 years of distance education experience reveal that successful completion of a virtual program requires that learners possess self-directed learning skills. Research demonstrates that not all learners have those skills and that a few hours of orientation is not enough to teach them. Capper and Fletcher's review (1996) found that the adult students most likely to drop out of distance education programs are those that are field-dependent (that is, significantly influenced by their surrounding environments) and that have an external locus of control, with a lack of self-regulation. Distance education is easier for those with self-directed or self-regulated learning skills (Thompson, 1984; Butler & Winne, 1995; Moore & Kearsley, 1996).

A variety of studies have suggested strategies for helping distance learners complete their programs. These include providing academic, social and administrative support services through study centers; encouraging the formation of study groups; allowing students to pace their own study and assignment completion; and providing opportunities for synchronous and asynchronous interaction through the use of various technologies (Sewart, Keegan & Holmberg, 1983; Candy, 1991; Capper & Fletcher, 1996).

It has also been suggested that organized sessions to facilitate self-directed learning are necessary to help learners develop and strengthen competencies such as an appreciation of the concepts of virtual learning, an understanding of how these differ from the concepts of traditional education, and the ability to manage and regulate their virtual learning processes. A meta-analysis on the effectiveness of distance edu-
Several well-established open universities throughout the world offer courses to help students understand distance education and to develop independent, self-regulated learning skills. Athabasca University in Canada offers a core course called “Introduction to Distance Education and Training” to all entering students, and the Open University of the UK provides a similar course to postgraduate students called “Foundations of Open and Distance Education.” Since development of self-regulated learning skills takes time and effort, offering a one-credit required course at a very early stage will help improve students’ completion rates and the quality of the learning experience.

Reducing Costs Without Diminishing Quality

Network integration and national planning

One of the important lessons to be learned from the Korean experience is that there is a strong need for an integrated network system that links the educational computer network to the national information superhighway. In many countries, the Ministry of Education is responsible for building an educational computer network system, and the Ministry of Information and Communication is charged with establishing the national information superhighway. The failure of these two ministries to collaborate may result in a disconnect between the educational network and the national information infrastructure, or other problems such as slow connection speeds and high connection costs.

Integrated network systems provide learning environments in classrooms, homes and workplaces, and minimize the exclusion of learners and schools in remote areas. Governments should develop a vision for an integrated network system that addresses both the network infrastructure needs of a society and the education use of a national information superhighway. Such integration allows higher education institutions to enjoy a high-speed national information superhighway and expanded network connections without additional investments.

In today’s world, limitations in access to an information and communications infrastructure has a direct negative impact on citizens’ abilities to acquire information and skills, and technology infrastructure indicators show great disparities both between countries and in different parts of the same country (World Bank, 1999; OECD, 1999). Before building an infrastructure, countries should develop a comprehensive and strategic plan for that infrastructure’s educational applications.

Database sharing

Since the cost of developing a database is high, most higher education institutions have experienced financial difficulties in establishing a large database for their students and staff. Virtual universities in a number of countries, particularly the United States, have “unbundled” many educational functions — such as virtual course development, distribution, tutoring, assessment, general administrative affairs and learner supports (Farrell, 1999; Dirr, 1999) — which are increasingly shared among specialized institutions.

Unlike analog systems, digital databases can be linked through computer networks, shared globally, revised by users, and transformed into meaningful knowledge. The Cyber Teacher Training Center, for example, is establishing a database of virtual teacher training programs in cooperation with other Korean teacher training institutions. Virtual training programs in this database can be used, revised and implemented in different ways by different centers, and sharing allows each training center to reduce its costs for program development.

Another example is the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM). ITESM is a 27-campus university system with more than 78,000 students throughout Mexico and Latin America. Using the IBM Global Campus — an integrated system which provides Internet access, tools to design online courses, and other databases — ITESM draws on resources outside its system and offers more than 2,500 distance learning courses to
students throughout the hemisphere (World Bank, 1998). With the Internet, a comprehensive intranet connecting its campuses and a distributed learning system called Lotus LearningSpace, educational resources developed by each instructor can be shared; students can interact collaboratively with other students and have direct access to instructors as well as library resources; and instructors can update their courses as needed. By sharing educational resources and providing additional classes and curricula without incurring the capital investment costs of building new campus facilities, immediate savings were reported.

**Partnerships and alliances**

Partnerships reduce the burden to single providers by distributing costs across partners. An example of a sound partnership is the one between Boston College and the government of Ireland. In collaboration with other business partners, these two entities are developing technology resources for both K-12 and higher education in a project called Schools IT2000. This project aims to integrate ICTs into Ireland's school system; Boston College provides much of the infrastructure and creates curricular materials, and Telecom Eireann provides Internet access (Oblinger, 1999).

By forming appropriate partnerships with businesses, universities diminish their investment risks. Governments should encourage such partnerships by instituting policies that provide incentives for private participation and investment in virtual education programs. Collaborations with training centers can also be mutually advantageous by permitting the exchange of technology and human resources and the sharing of courses. Each center can develop virtual courses in its areas of specialization and exchange access to those courses with its partner institutions. Partnerships can also be formed with universities or companies in foreign countries.

**Promoting Virtual Education**

**Pricing policies**

In Korea, as in many other countries, special rates known as E-rates are applied to the educational use of network communications in primary and secondary schools. Network communication fees for Internet use in these schools are less than 20 percent of the fees for other organizations, but preferential rates are not applied to higher education institutions and teacher training centers. Since network use is reportedly increasing five to ten times each year at these levels, it is important that the E-rate be instituted here as well. In turn, the government should provide incentives (such as reduced taxes, exemptions for educational investment, or publicity for participation in national ICT initiatives in education) for telecommunications companies to develop special pricing for the educational application of ICT and virtual online teaching. In light of the rapid growth of virtual education, it is necessary to review national information and telecommunications policies and regulations to ensure that they support the effective and flexible use of ICT in higher education and training.

**Legal and policy foundations**

Korea's Lifelong Education and Higher Education Laws, which promote virtual education for retraining and lifelong education in higher education institutions, are expected to bring enormous increases in the use of network technology in higher and lifelong education. Providing the appropriate legal foundations at the national and institutional levels is essential. First, at the national level, the establishment of virtual education institutions or virtual campuses within conventional universities or training centers must be permitted. Those virtual institutions should be able to provide degree-granting programs and other certificate programs and, at the same time, practical strategies to control the quality of virtual education should be built into the national education quality assurance system.

Second, at the institutional level, legal barriers to online teaching should be removed. Many conventional education institutions require classroom attendance for a certain period of time and demand fixed teaching or training schedules. Since most of the teaching and learning activities in virtual education programs occur outside of the classroom on a flexible schedule, these regulations must be reviewed and revised.

Policies regarding credit transfer must be examined as well. In many countries, restrictions regarding the
transfer of course credits among different institutions constitutes a major restraint for learners registered in courses at several institutions who wish to transfer into a specific program. To help students' function as true virtual learners, a flexible transfer system must be established.

The government should also provide incentives for training institutions to restructure their programs in a more flexible way. Incentives may include providing seed money for initial online course development and recognizing excellence in virtual teacher training programs.

**Personal incentives**

At the course development stage, virtual education demands more work from academic staff than conventional classroom education. Once the course is developed, faculty members only need to update and manage the course site, although if they design a course requiring extensive interaction, their workloads will exceed those of conventional classes during teaching as well. Once the virtual course is created, however, teachers are freed to devote more time to advising and other activities. Teachers may also be able to reach more students and create an interactive environment without the logistical distractions of materials distribution. Virtual office hours may also be established to save scheduling time (Williams & Peters, 1997).

In some cases, providing incentives at the institutional level or emphasizing the positive features of virtual education is not enough to promote the use of technologies, especially at the beginning stage. Korean experiences in implementing online technologies indicate that different types of personal incentives for staff can accelerate the use of advanced technology in education. When KNOU first announced the development of Web-based instruction, only a few faculty members volunteered to offer Web-based courses. But when these instructors were offered a $2,000 honorarium in addition to development costs, the number of virtual course offerings increased significantly.

Some universities participating in the Virtual University Trial Project lighten the official burden of faculty who offer or support virtual courses. Others provide these faculty with expensive professional training. As online materials are accumulated and academics become more comfortable with virtual education, fewer incentives are necessary.

**CONCLUSION**

Korea recognized early on that providing its citizens with flexible lifelong learning opportunities is crucial for workforce skills development and responded with the creation of the distance education programs through the Korea Air and Correspondence University which evolved into the Korea National Open University. KNOU, as evidenced by its high enrollment rates, served as a leader in the provision of distance education programs since the 1970s.

In order to keep pace with rapid changes in the global economy Korean policy makers recognized the need to further open-learning opportunities to its citizens so that they could remain competitive in an information-based and technology-driven world. They responded with bold reforms in tertiary education and lifelong learning followed by financial support and experimentation so that institutions make the transition to a more competitive arena in education. The expansion of traditional distance learning opportunities through the development of virtual education has been one avenue vigorously pursued because of the potential for higher quality teaching and learning and greater cost savings.

However, the government also recognized that its education system could not rise to this challenge without a supportive environment in which to experiment. Furthermore, synergies across government ministries and with the private sector were nurtured, especially in the area of the national information infrastructure. Preliminary data shows that cost savings can be realized through the use of virtual education and that quality learning does take place. Korea stands as an example of strong government leadership in the area of education for national development.
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