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Résumé de l'article

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Insung Jung

Abstract

To meet the need for flexible and interactive teacher training, the Korean government created a Cyber Teacher Training Center (CTTC) in the summer of 1997. The CTTC project developed a software platform for managing online inservice teacher training, eleven general training courses, with plans to add more courses each year. This article examines the needs met through the introduction of online inservice teacher training and the strategies that have been employed in the process. This paper also analyzes the major impacts of online teacher training and looks at the challenges facing online inservice teacher training in the coming years.

Introduction

With the development of new information and communication technologies (ICT), online education is being used in many developed, and some developing, countries to bring wider opportunities to people in the form of flexible, open and distance learning systems (Farrell, 1999; Perraton & Postshnik, 1997). Online education is defined as an innovative form of distance education that delivers instruction to a remote audience, using computer networks as the main medium. The general purposes of online education are to: (a) increase access to education for individuals located throughout the world, (b) remove barriers of time and space, and (c) develop a cost-effective approach to providing interactive learning opportunities for adults (Harasim, Hiltz, Teles, & Turoff, 1995; Hiltz, 1994; Khan, 1997). Online inservice teacher training is a form of online education that uses computer network technologies to organize, develop, manage, and administer inservice teacher training. If online teacher training programs are well designed, they can broaden the range of teacher training opportunities and reduce the costs of providing retraining opportunities to teachers by adopting information technology, and sharing educational resources. Research and case studies show that online training via the Internet provides an opportunity to develop new learning experiences for learners by managing self-directed learning, and sharing information and ideas in a cooperative and collaborative manner (Harasim, et al., 1995; Hillman, 1999; Moller, 1998; Thompson & Chute, 1998; Trentin & Scimeca, 1999).

Online education is not yet the prevalent method of providing inservice training for the more than 340,000 teachers in Korea. However, for several years, a number of teacher training centers in the Korean provinces, and other teacher education institutions, have used the commercial Internet Service Providers' network to distribute learning materials and to encourage interaction between trainees and trainers. There are several commercial Internet Service Providers (ISP) in Korea that provide text-based online services and Internet access. Through these ISP networks, subscribers can access an online database, as well as interact and share materials with other network subscribers. They can also access the Internet from home or other places. In addition to such ISPs, with financial support from the Korean government, major initiatives have been launched to develop totally Internet-based online teacher education programs.

Since the computer network system was established and ICT was adopted in education in Korea, online teacher training has been seen to have several benefits. In addition to making teacher training more cost-effective and efficient, the major goals of online teacher training are to help teachers: (a) access training opportunities without leaving their classrooms; (b) improve their computer literacy, and interact online with their trainers and other teachers; and, (c) once a "bank" of online courses is developed, to access those courses that meet their individual needs.

Objectives of this Case Study

This study describes a Korean initiative to develop and implement online education for inservice teacher training, and includes concrete recommendations to guide educational policy makers. The key questions addressed in this article are:

- Why were technology innovations introduced into Korea's inservice teacher training?
- How have the innovations been implemented?
- How do the teachers involved in the process evaluate the innovations?
- How have innovations influenced inservice teacher training methods and policies of the training institutes?
- What recommendations can be drawn from Korea's efforts?

The methods used to conduct the case study include: (a) analysis of Korea's official documents and Web sites, (b) informal individual interviews with several providers of online inservice teacher training in Korea, and (c) analysis of a formative evaluation report conducted by a research institute. Because this is a

case study and not an evaluation, application to other contexts should be made with caution. Nevertheless, the findings of this study may be useful for other countries and teacher training institutes seeking to integrate computer network technologies into inservice teacher training programs.

Background

In 1987, the Korean government developed an action plan for the large-scale introduction of computers into primary and secondary schools. With financial support from Korea Telecom, the Ministry of Education (MOE) between 1989 and 1996 invested about \$53 million (US) in establishing computer systems and networks in schools. By 1996, every school in Korea was equipped with an average of 33 computers, and in 1997, the government initiated a comprehensive 6-year strategic plan to establish an advanced educational infrastructure. Since 1997, the Korean government 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 each teacher.

Tables 1 and 2 show the numbers of students and teachers per computer in Korean schools in 1997 (Ministry of Education [MOE] & Korea Multimedia Education Center [KMEC], 1998). Contrary to what most would expect, the ratio of students to computers is much lower in primary schools than in the secondary schools (Table 1). There are two major reasons for this. First, the government distributed computers to the primary schools ahead of secondary schools because primary school students are not under pressure to take the university entrance examination and had more time to “play with computers.” Underlying this decision was the bias that computers are not for serious study, but for play. Second, it was thought that younger students could learn to use computers faster and more easily than older pupils. Thus, IT experts recommended that the government provide computers to the primary schools first and to secondary schools later.

Table 2 shows that, as of 1997, roughly one out of three teachers had a computer. By 2002, every teacher will have his or her own computer, and every school will have at least two multimedia computer labs with 30 to 50 networked computers per lab (depending on the number of students in a class).

By the end of 1997, about 20% of Korean schools had established LAN systems and were linked to the Internet. In 1998, responding to schools' concerns regarding high costs of Internet connections, the government introduced a line item in budgets to cover the costs of these fees, either by paying a one-time up-front charge for a dedicated line or a monthly portion of a school's telephone bill. More than 50% of schools subscribe to text-based PC online services from a local or national PC network company, although many are migrating to full

Table 1: Number of Students per Computer (1997)

| School Level | No. of Students per Computer |
|--------------|------------------------------|
| Primary | 18.8 |
| Middle | 20.9 |
| High | 27.5 |
| Vocational | 7.2 |

Table 2: Number of Teachers per Computer (1997)

| School Level | No. of Teachers per Computer |
|--------------|------------------------------|
| Primary | 2.8 |
| Middle | 3.5 |
| High | 3.3 |
| Vocational | 3.8 |

Internet access, often being offered by the PC network company. By the end of 2002, all Korean schools will have Internet connections using high-speed lines such as ADSL or ISDN.

Implementation: Needs and Strategies

Using existing infrastructure in schools

With the growth of computer network infrastructure in schools, and policy support from the government, administrators and teachers have begun advocating online or distance teacher training using the advanced technologies already available in schools and training centers.

Each of the 16 provincial offices of education in Korea provides inservice programs through teacher training centers, and in collaboration with colleges and universities in nearby provinces. Several of these centers adopted the text-based computer network as a teaching and communication tool along with conventional face-to-face training methods. This required little investment since the network companies conducted the initial development of text-based teacher training materials in order to attract subscribers from teacher groups, and the technology was already in the schools.

Nine of the teacher training centers have used the PC network to distribute text-based course materials, announce important messages, and allow participants to interact with others on specific issues. These networks have also been used to encourage interaction between trainers and learners in 79 general and specialized training courses that were recommended to all secondary school teachers. The network has been used to supplement to conventional teacher training in most of the online programs, although little tutorial support from instructors was provided. However, some courses use the PC network as their main training medium, and these courses make greater interactivity with course instructors available to learners.

Teacher training centers operated by the provincial offices of education have adopted the text-based PC network using telephone lines because it is fast, economical, and utilizes schools' existing computer and network infrastructure. However, until recently, most centers have ignored the fact that schools usually have only a few telephone lines for all staff members and cannot assign separate telephone lines for teacher training. In addition, until 1998, schools were required to pay transmission fees. As a result, even though schools had computer and network systems that could be used for online training, those systems were not fully used because of a lack of telephone lines and transmission fees.

Only a limited number of schools, those with connection to a dedicated high-speed educational network system, encourage their teachers to use the school infrastructure for online training. Rather, most schools request that teachers use the school network only for administrative and direct instructional purposes. Teachers are encouraged to use the PC network at home to download training materials and to communicate with other teachers during their training. Teachers have thus become relatively heavy users of the text-based PC network using their home telephone lines. One commercial PC network company's internal report indicates that teachers are the second largest group of network users.

One lesson that can be learned from this experience is that in order to maximize the use of the school computer network system, financial support must be secured for both telephone lines and transmission costs. Fortunately, in 1998 the Korean government and the Provincial Offices of Education began to provide \$1 million (US) for school transmission fees, with the allocation increasing to \$3.4 million (US) in 1999 (MOE & KMEC, 1998).

Improving teachers' computer literacy

Since 1988, the Ministry of Education and the Provincial Offices of Education have provided inservice to enable teachers to use educational technologies in the classroom. Between 1988 and 1998, all primary and secondary teachers received 30 to 180 hours of training in ICT. In the early years, the training focussed on understanding computer technology, and acquiring skills in programming and developing computer-assisted instruction. Later, the focus shifted to emphasizing the educational use of computers and the network system in schools. However, this training consisted mainly of large group, face-to-face lectures with limited time for hands-on practice. Many teachers who were trained in the use of technology in teaching reported a lack of confidence in their ability to introduce computers and the Internet into their classrooms. They complained that most of the training time was spent in delivering information and not enough opportunities were provided for practice (KMEC, 1998a).

Online teacher training using the PC network was expected to provide teachers with the opportunity to actually use ICT for their own learning and thus, to improve the computer literacy of teachers. Is online teacher training really contributing to teachers' computer literacy? Is it promoting the use of technology in teaching and learning? Do teachers who use the PC network or Internet for their own learning develop computer literacy more effectively than others who receive only conventional classroom training in technology use? Even though no systematic study has been conducted to answer these questions, the following findings suggest that online teacher training has been effective in improving the computer literacy of teachers (KMEC, 1998a).

1. Many teachers who used the local PC network for their training later joined a voluntary online teachers' club, exchanged ideas and materials with other teachers and used online materials in their own teaching. Since the teachers' use of the computer network has increased, most of the PC network companies in Korea now provide online teachers' clubs. In a teacher's club, participants communicate with other teachers who have similar interests, and they share teaching materials and information. It appears that teachers who have participated in online training continue to use the network for purposes other than training.
2. Since 1991, hundreds of voluntary study groups have formed to promote computer use in schools. The Korean government provided initial operational funds to encourage voluntary study groups in schools. At least 50% of the teachers in these groups have taken one or more online training courses. Participants in online training appear to lead their schools' use of technology more actively than non-participants.
3. Those teachers who took an online course in the past tend to enroll in other online courses, and perform better in the courses than novice users

of online education (Jung & Choi, 1999). In general, the computer literacy skills obtained during online training tend to be applied to the next iteration of technology.

Establishing Cyber Teacher Training Center

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 the technology, and quality training programs that allow the active involvement of teachers in their learning process (KMEC, 1998a). This report noted that most teacher training programs are delivered in a large classroom environment, with little interaction between instructors and teachers, or among teachers. It also indicated that teachers preferred online training since it provides a more flexible learning environment and allows them to be involved in more meaningful interaction without barriers of either time or space. The study recommended introduction of online teacher training programs using the Internet as a means to improve overall inservice teacher training.

To meet the need for the flexible and interactive teacher training outlined in the evaluation report, the MOE and the Ministry of Information and Communication jointly funded a project to create a Cyber Teacher Training Center (CTTC) [<http://edunet.kmec.net>] within the Korea Multimedia Education Center (KMEC) in the summer of 1997. KMEC supports implementation of online education in primary and secondary schools and provides online inservice teacher training. Using government funds, KMEC conducted various activities such as: (a) researching the current use of technology in schools; (b) implementing technology initiatives; (c) developing online learning materials for teachers, students and parents; (d) supporting schools in creating their homepages; and (e) providing a comprehensive educational Internet service called EduNet. In April 1999, KMEC and another government-supported institute, Korea Research Information Center, were united as the Korea Education and Research Information Services

The project to create CTTC developed a software platform for managing online teacher training, and 11 general education courses with more courses to be added each year. These courses, which target secondary school teachers, are now available through KMEC's EduNet and include titles such as "Computers and the Information Society," "Educational Reform," "Future Society and Education," "Environment and Education," and "Review of National Morality."

Most of the online training courses offered by the CTTC that have scheduled start dates are developed as self-directed and self-paced Web-based learning programs and last from a few hours to several months, depending on how the course is designed. The facilitator of each course is encouraged to provide online support and motivation to teachers, give task-oriented feedback and evaluate

the teachers' performance. Group discussions among the learners also are encouraged, with some courses requiring participation in one or two face-to-face tutoring sessions. Although teachers are sometimes evaluated on their participation in online discussions and are required to submit a report, all the courses include a final examination in a regular classroom. The final examination results are directly related to promotion.

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

Formative Evaluation of Cyber Teacher Training Center

Teacher reactions and suggestions

A formative evaluation (KMEC, 1998b) was conducted to test the management platform of the Cyber Teacher Training Center, to obtain the learners' views, and to explore ways of improving the programs. The following is a description of the results of this evaluation.

1. Of the 680 teachers enrolled in 11 online courses, 54% responded positively to the online training courses.
2. Those who responded negatively cited a lack of appropriate instructional design strategies that allowed learners to use various features of the Internet such as online conferencing, e-mail and hyperlinks with other databases.
3. Approximately 43% of teachers used the Internet in their schools and 42% used it in the computer laboratory at the Provincial Office of Education or KMEC because of their high-speed connections and no transmission fees. Only 15% of the teachers studied at home.
4. More than 70% of respondents indicated that they preferred online training to the conventional method because of its flexibility and attractiveness.
5. Teachers commented negatively on the method of testing in their online training courses. They indicated that it was inappropriate to administer tests for online courses in a regular classroom, and 30% recommended an online test instead.

6. Lack of interaction between instructors and teachers, and among teachers, was reportedly due to instructors' time constraints and lack of online facilitating skills.
7. Most of the instructors in the online training courses were recognized and busy scholars in the specific content areas and were unavailable for frequent learning support. Teachers indicated that instructors' failure to respond, or delay in responding, to teachers' questions was one of the major problems with the online training courses.
8. Most instructors lacked the necessary skills to facilitate participants' online interaction. Well-organized online discussions with relevant topics can help learners acquire high-level skills such as problem-solving and knowledge construction, and stimulate active learner-learner interaction. Without prior training in online facilitating skills, many of those instructing online teacher training courses could not organize online discussions effectively and thus failed to provide interactive learning environments.
9. These results show the possibilities of Internet-based courses in providing a flexible learning environment, but also suggest several areas for improvement including instructional design, online facilitation and high-speed connectivity.

Factors affecting effectiveness

How might online teacher training programs be improved? The results of this evaluation suggest several points for the improvement of online teacher training programs. First, it is important to integrate instructional design considerations into the development and implementation processes of online training courses. Second, early training sessions should be provided to help instructors acquire effective online facilitating skills. Third, high-speed connectivity is important in promoting active use of the Internet in teaching and learning.

Another study (Jung & Choi, 1999) of two online training courses in the private sector confirms these points. Jung and Choi identify several factors that affect the educational effectiveness of online courses. In particular, good design strategies that incorporate various Internet features and encourage active interaction with the instructors and other learners in an organized way are closely related to the quality of online courses. Use of these strategies may also lead to greater perceived learning, high levels of learner satisfaction with the courses and greater information literacy gains.

Training costs

KMEC provides a common platform for developing and managing online teacher training courses, along with a sample of courses that can be revised easily and integrated into other training activities by individual training centers. In turn, online courses developed by training centers may be linked to the KMEC's EduNet and shared with other training centers. Although at this stage there is no concrete data comparing the relative cost-benefit of online versus conventional teacher training, sharing training programs among training centers is likely to reduce training costs in the long run.

An internal evaluation report prepared by the Distance Education Team in the Samsung Human Resources Development Center in Korea recommends a number of strategies to reduce training costs using the Internet. Some of the strategies recommended by the Samsung team include sharing courseware or databases with other training institutes, adopting student-led interaction, and increasing the number of times training with courseware is used. According to the report, if an Internet-based training course is used twice a year, for 3 years, with at least 400 trainees per year, then the cost of online training courses would be reduced by 10% to 15% as compared to conventional delivery formats.

Impacts

Teachers' increased interest in online training and the government's financial and policy assistance have motivated provincial training centers and other institutions to adopt online teacher training.

Adding more online teacher training courses

In addition to teacher training centers, some universities have begun to offer online teacher training courses. During the winter of 1998, over 40 teachers were enrolled in the Open Cyber University's online courses, and the Sookmyung Cyber Education Center had 100 teachers enrolled in its Web-based training programs for general English experts, TESOL experts and music therapists. In 1999, this center added additional online programs for child education experts and nutrition counselors. More online education providers are expected to offer Internet courses for teachers in the near future.

In the winter of 1998, the Ministry of Education sent an official notice to the 16 provincial teacher training centers announcing that 145 volumes of teacher training materials had been digitized by KMEC and were accessible via the EduNet or commercial PC network. These materials were intended for use by individual teachers, in face-to-face courses, or as resources for online courses offered by

the centers. Because teachers now have greater autonomy in selecting courses, many training institutions are preparing Web-based courses for teachers. It is likely that a more competitive teacher training market will emerge.

Raising instructional design and quality issues

The KMEC-designed online training courses were revised based on the teachers' evaluations. Some of the changes included: (a) adding more authentic cases, (b) requiring the active involvement of participants in online discussion groups, and (c) emphasizing online facilitating skills during instructor training seminars.

As a result of teachers requesting more individualized learning experiences in online training courses, some courses now offer learners the option to develop their own learning objectives and to select course content based on those objectives. The standardized format of the online teacher training courses must be adapted so that each course can meet the different learning needs of individual teachers.

Changes in teacher training policies and financing strategies

During implementation of online teacher training, it became apparent that there are a number of policies that function as barriers or impediments to online delivery. The policy that requires a certain number hours of classroom attendance for course credit, and the use of a norm-referenced grading system are examples of such barriers. In order that that new modes of education be integrated into the teacher education system, these barriers must be removed. For example, the current norm-referenced grading system within a specific training class consisting of 50 teachers may not be suitable for a online training course which is delivered to more than several hundred teachers. In fact, the norm-referenced test has been criticized by many educators because it has not adequately provided evidence that each teacher has achieved course objectives and shown teaching performance improvement. A criterion-referenced grading system must be integrated into the current evaluation system of online inservice teacher training courses since the teachers are encouraged to develop their own learning objectives and to select course content based on their 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 is expected to revise its teacher training policies to reflect the above considerations and to permit various forms of online education for teacher training.

Future Challenges

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

Improving quality of teacher training

While Korea has explored some strategies to improve the quality of online in-service teacher education, as discussed here, it must continue to explore more sophisticated means of improving quality and effectiveness of online education. Future studies should address questions in the areas of instructional design, active learner involvement, motivation, and learner support.

Some of these questions have been answered. For example, in comparing two different instructional design strategies for Web-based training courses for corporate employees in Korea, Jung and Leem (1999) reported that a Web-based course which adopted design strategies to provide specific guidelines for self-directed learning appeared to be more effective than a course which provided a more open-paced problem-based learning environment. The Web-based course, which presented content in small chunks, provided specific guidelines to help learners manage their daily learning schedule and provided opportunities for self-examination through various types of checklists. The completion rate for this course was 93%, and the average grade was 85%. In another Web-based course, each learner was asked to solve authentic problems individually, using various online resources. Later, students collaborated with other learners to improve individual solutions. The completion rate for this course was 72%, and the average grade was 62%. It was determined that a course that required active online discussion and individual research for Web resources without specific guidelines was somewhat inappropriate in a corporate training context in Korea. But with teachers, these results may not be applicable.

Yet another example is a study that explored motivational strategies for online education. Gunawardena and Zittle (1997) reported that *social presence* – the degree to which a person is perceived as a real person in the media-mediated learning environment created by instructors – was a strong predictor of learner satisfaction, and thus, motivation, in a computer conference.

There has been little empirical research exploring the effects of specific design strategies on students' learning and motivation. Future research should examine effective design strategies to develop quality online teacher training courses in

a variety of learning contexts.

Reducing training costs

Cost reduction is frequently cited as an objective to be served through the introduction of ICT in education. Declining ICT costs have made computer-aided and online instruction increasingly feasible. Moreover, the cost savings of distance education using advanced technologies are much greater than in the past (Wolff, 1999). Nonetheless, costs are still significant in most countries and investment tradeoffs must be made. In fact, not much research has been conducted to assess cost-effectiveness of Internet-based online education. Even in the studies of cost-effectiveness of online education, costs of development or costs born by students are often excluded (Bakia, 2000), and “many are incomplete or use competing methodologies, making them difficult to compare” (p. 51).

Examining the costs of shifting from print-based courses to online delivery, Inglis (1999) showed that online delivery was less economical, when measured on a cost per student basis, than print-based delivery for four different intake levels (50/100/150/200 students). The distribution costs (such as ISP charges and individual support) for online courses represented a major component of overall costs. It is likely that the costs of mounting subjects online will be considerably higher, rather than lower, than the estimates given in this paper. The results of this study, in part, reflect the fact that in traditional print-based distance education most of the economies of scale that are obtainable in the design, development and delivery stages have already been obtained. Several strategies to balance costs with benefits in online education are suggested.

Whalen and Wright (1999) report that Web-based training has higher fixed costs than classroom based training but these higher course development costs are offset by lower variable costs in course delivery. In general, Web-based training is more cost-effective than classroom teaching mainly due to the reduction in course delivery time and the potential to deliver courses to a larger number of students in Web-based training. Because of the cost of having a live instructor and the greater student salary costs due to the extra time required to deliver the course, asynchronous teaching on the Web was more cost-effective than synchronous teaching on the Web. Also, the online education platform costs affect cost per course due to the different license fees and upgrading costs across the platforms. The amount of multimedia content in the courses was an additional significant factor in costs.

A preliminary report of cost-effectiveness of online courses at the Korea National Open University (Jung & Leem, 2000) shows that the development and delivery costs for online education decrease over time (cost per online course was \$12,768 [US] in 1998 and \$7,902 [US] in 1999). When compared with a

traditional distance education course which used TV and textbook, an online course had higher completion rate (93% in the online course versus 55% in the traditional course) and thus lower cost per completer. The students in the two different courses show significant differences in learning achievement and technology literacy level (Jung & Leem, 2000).

While the studies reviewed above provide some ideas about cost-effectiveness of Internet-based online education, we still need rigorous, experimental studies in various contexts to make a firm conclusion on cost-effectiveness of online education.

Enhancing self-directed learning skills of teachers

It is often assumed that adult learners can successfully complete an instructional program if the program is well designed and taught effectively. But distance teaching experience in many countries reveals that the successful completion of an online program requires adult learners to possess self-directed learning skills. Based on research evidence, Capper and Fletcher (1996) found that adult students most likely to drop out of distance education courses are field-dependent – that is, more influenced by the surrounding environment – and have an external locus of control, lacking self-regulation in their learning. In other words, distance education is easier for those who have self-directed or self-regulated learning skills (Butler & Winne, 1995; Moore & Kearsley, 1996; Thompson, 1984).

A variety of studies introduced strategies for supporting distance learners to complete their programs: providing academic, social and administrative support services through study centers, encouraging study group activities, allowing students' own pacing of study and assignment, and providing opportunities for synchronous and asynchronous interaction using various technologies (Candy, 1991; Capper & Fletcher, 1996; Sewart, Keegan & Holmberg, 1983). It is also suggested that organized sessions to facilitate self-directed or self-regulated learning, along with a long-term vision, are necessary to help learners develop and strengthen competencies such as an understanding of the concepts of online learning, how these differ from the traditional concepts of education and the ability to manage and regulate their online learning processes. Needed is a system to enhance teachers' self-directed learning skills that are necessary to successfully complete online training programs. Since development of self-regulated learning skills takes time and effort, offering a required one-credit course on self-directed learning at a very early stage of online education could perhaps increase both completion rates and the quality of learning for inservice teachers.

Conclusions and Recommendations

Online teacher training is seen to have several benefits: (a) teachers can access inservice training without leaving their classrooms; (b) teachers can improve their computer literacy; (c) teachers are better able to interact with their trainers and other teachers online; and (d) once a database of online courses has been developed, teachers can access those courses that meet their individual needs. Although sufficient data to support this is not yet available, online teacher training also shows a possibility of being more cost-effective and efficient.

Online media eliminate the spatial limitations and time constraints of more conventional teacher training methods, removing the need for the learner to be present at a training site at a designated time. If designed and used properly, information and communications technology has the potential to make teacher training more effective, affordable and flexible. Korea's experience with inservice online teacher training suggests several strategies for improving the quality of teacher training, reducing training costs and developing appropriate training policies. Strategies for improving the quality of online teacher training include:

- Applying a systems approach to training program design
- Encouraging trainer-trainee and trainee-trainee interaction
- Building a regular monitoring and evaluation system
- Providing learner training for self-directed or self-regulated learning
- Investing in trainer training

Strategies for reducing training costs without diminishing quality include:

- Sharing online databases with other training institutes
- Building appropriate partnerships between the public and private sectors
- Encouraging use of already established infrastructure for training

Strategies for developing adequate legal and policy foundation include:

- Removing such barriers for online teacher training as requirements regarding classroom attendance and the use of a norm-referenced grading system
- Providing incentives for teacher training institutions to restructure their programs and to include online teaching as part of their future initiatives

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