FLORIDA STATE UNIVERSITY

A COST-EFFECTIVENESS ANALYSIS OF
FACE-TO-FACE AND INTERNET-BASED INSTRUCTION

AN ACTION REPORT SUMBITTED TO
THE FACULTY OF THE COLLEGE OF SOCIAL SCIENCE
IN CANDIDACY FOR THE DEGREE OF
MASTER OF PUBLIC ADMINISTRATION

REUBIN O’D. ASKEW SCHOOL
OF PUBLIC ADMINISTRATION AND POLICY

BY
KANG KOOK LEE
TALLAHASSEE, FL
April 17, 2005
April 17, 2005

Mr. Seol, Dong Keun
Superintendent
Busan Metropolitan City Office of Education
455-1 Yangjeong-dong, Busanjin-gu,
Busan, Republic of Korea, 614-703

Dear Mr. Seol:

It is my pleasure to submit to you A Cost-Effective Analysis of Face-to-face vs. Internet-based Instruction. The information presented is a result of extensive research and data analysis during the 2005 Spring semester. Recently, with the rapid growth of the Internet and other distance technologies, Internet-based course delivery has become an attractive option for expanding the educational opportunities available to learners.

Up to now, many studies have been conducted to compare on-line courses with offline ones. Advocates of distance education agree that computer networks over Internet have the potential to improve access to and quality of education institutions. However, opponents of distance education assert that despite its advantages, distance learning has various problems, such as the quality of instruction, hidden costs, and the attitudes of instructors and learners.

This report is intended to assist educators and policy-makers in examining whether Internet-based instruction is better, worse, or as good as traditional face-to-face instruction. My recommendation is that educational programs need to use a blend of both methods in order to maximize the advantages and minimize the disadvantages of each. The analysis shows that there is no significant difference between two instruction methods. When done effectively, the Internet-based course offers individualized learning and self-paced learning beyond a time and place bound. The best use of new technology in educational programs is to enhance rather than to replace traditional face-to-face instruction.

If you have any questions or if I can be of any further assistance, please do not hesitate to contact me at (850) 297-0574 or by e-mail at kkl03d@fsu.edu.

Sincerely,

Kang Kook Lee, MPA
Florida State University
# TABLE OF CONTENTS

**LETTER OF TRANSMITTAL** i

**LIST OF TABLES** iii

**EXECUTIVE SUMMARY** iv

**Chapter**

**I. PROBLEM STATEMENT** 1

**II. BACKGROUND AND LITERATURE REVIEW** 3

- **Background** 3
- **Literature Review** 5

**III. METHODOLOGY AND EVALUATION CRITERIA** 10

- **Methodology** 10
- **Evaluation Criteria** 12

**VI. POLICY OPTIONS** 13

- **Face-to-face Instruction** 13
- **Internet-based Instruction** 18
- **Comparison** 25

**V. CONCLUSIONS** 28

**REFERENCES** 30
LIST OF TABLES

Table

1. Breakdown of personnel costs (for the traditional course) 15
2. Breakdown of equipment costs (for the traditional course) 17
3. Comparison of the traditional and Internet-based course 19
4. Breakdown of personnel costs (for the Internet-based course) 21
5. Breakdown of equipment costs (for the Internet-based course) 23
6. Comparison of costs 25
7. Comparison of average exam scores 27
Executive Summary

Since the 1990s, South Korea has developed and implemented the concept of an ‘Edutopia,’ which means an open and lifelong learning society. As people are faced with the necessity of continuing education throughout their lives, convenient Internet-based courses appeal to those people as a useful learning mode. With the rapid growth in computers and Internet, the Internet-based instruction is reshaping the way traditional face-to-face instruction deliver knowledge to learners.

The purpose of this report is to examine if there is a significance difference between two instruction methods. In other words, this research is designed to analyze and compare costs and effectiveness of Internet-based instruction with those of traditional face-to-face instruction.

Information for this report was collected using three methods. First, academic literature was analyzed to provide background information into strength and weakness of the face-to-face vs. Internet-based instruction and the development of distance education programs. Second, government agency reports on the necessity of convenient distance education and comparison of two different instruction methods were reviewed for policy and statistical information. Third, the
data from an educational district of Seoul in South Korea were used to analyze the
costs and effects of two alternatives.

Two policy options were constructed to determine which instruction method
is more cost-effective in delivering knowledge to learners: the face-to-face vs.
Internet-based instruction. Each option was evaluated against six criteria:
personnel, equipment, facilities, client input, opportunity costs and performance
(final exam scores).

Based on analysis of the policy options in consideration of the evaluative
criteria, there is no significance difference between two instruction methods. Today,
both the face-to-face and Internet-based instruction methods are used in
educational programs. According to Leung and Tran (2000), the advantages of
face-to-face and distance learning methods complement each other. So, with the
increase in the use of information technologies for distance learning, educational
programs use a blend of both methods in order to maximize the advantages and
minimize the disadvantages of each.
I. Problem Statement

In the 1990s, Korea developed and implemented the concept of an “Edutopia” intended to create an open and lifelong learning society. Specifically speaking, Edutopia is ‘an educational welfare state- a society of open and lifelong education to allow each every individual equal and easy access to education at any time and place.’ There have been tremendous changes in education to implement Edutopia in harnessing information and communication technologies for flexible and lifelong learning in Korea.

So, as people are faced with the necessity of lifelong learning, Internet-based instruction appeals to people as a useful learning mode and the demands for convenient distance education programs such as Internet-based courses are intensified.

Instruction involves the development and communication of knowledge through a viable medium. While traditional classroom instruction is defined as time and place bound, face-to-face instruction, typically conducted in an educational setting and consisting primarily of a lecture/note-taking model, the term ‘internet-based instruction’ is a generic term that, by definition, implies that the learner is
physically separated from the instructor and connected through the use of a computer and a network or Internet link. Related terms include Computer Assisted Instruction (CAI), Computer Mediated Instruction (CMI), Distance Education (DE), On-line Education (OE). Internet or a computer network is a viable tool help learners gain an education without being on campus (Ramage, 2002).

Recently, with the recent growth of the Internet and other distance technologies, as Internet-based course delivery has become an attractive option for expanding the educational opportunities available to learners, there is growing need for researchers and policy-makers in comparing cost-effectiveness of face-to-face and Internet-based instruction methods in South Korea. So, the purpose of this study is to compare and analyze costs and effectiveness of face-to-face instruction with Internet-based instruction in the in-service teacher training. In other words, this study is designed to examine if Internet-based instruction is better, worse, or as good as traditional (face-to-face) instruction.
II. Background and Literature Review

1. Background

A growing number of organizations are now delivering training and education over the Internet, including colleges, universities, corporations, and government agencies. Computers and the Internet have the potential to improve access to and quality of educational institutions. The Internet-based learning will eventually reshape the way offline education institutions deliver knowledge to students. As e-learning is quick to adopt up-to-date content, latest theories and practical skills, offline schools and institutions will be forced to adapt and reform if they want to stay competitive in the face of new challenges from the Internet-based education programs.

South Korea is one of the countries with rapid growth in the Internet community and related business. Korea Internet White Paper (2000) by NCA (National Computerization Agency) records that the number of Internet users was sharply increased to about 16.4 million (a total population of 43 million) as of August 2000, 100 times compared to 0.14 million Internet users at the end of 1994. The master plan of Cyber Korea 21 was established in 1999 as a vision for
constructing a creative knowledge-based society. On the vision of Cyber Korea 21, all people can use the Internet to get the knowledge and information, expand opportunities for education, and enhance the quality of life.

Now, Korea’s tradition-bound education institutions are facing a high tech challenge from online lecturers and multimedia-packed classes. The Internet becomes a driving force reorganizing the educational system in Korea. One of the advantages the Internet-based learning offers is that its content, once digitally created, can be played endlessly on the Web. And there is no classroom limit: as long as enough Web servers are installed, thousands more learners can log on to a single multimedia program at the same time.

In recent times, most countries as well as South Korea have a growing concern on the Internet-based instruction and have conducted various studies that attempt to assess the costs of providing an on-line course. So, it is important for both academics and policymakers to pay close attention to the cost-effectiveness of the Internet-based instruction and to gain a more complete understanding of factors influencing the cost-effectiveness, when compared to the face-to-face instruction.
2. Literature Review

- Is there a significant difference between face-to-face and Internet-based instruction? -

A number of studies have been conducted that review costs and effectiveness of Internet-based instruction when compared with the face-to-face instruction, focusing on analysis of costs and measurable learner performance.

Can information technologies really reduce the unit costs of instruction? Startup costs (hardware, software, and etc), maintenance costs, and personnel costs should be considered as true costs for Internet-based instruction. In addition, the costs associated with training technician and instructors should be taken into account, because those people delivering the instruction should be well trained for more effective Internet-based instruction. A study by Phelps et al. (1991) found that “the potential cost-effectiveness of using online technologies in distance education is still uncertain” (p. 30).

Ng (2000) notes that the cost of online courses is affected by how they are implemented: as an enhancement or as the primary teaching medium. If it is implemented as a primary teaching medium, it is considerably more expensive. Carr (2001) discusses a report by the California State University System that
looked at cost savings in distance learning programs. The report found that only in really large courses with many sections would cost savings be possible. Courses in excess of 500 students would be benefit from online setting, while it was still more cost effective to teach smaller groups in a traditional setting.

Among a multitude of comparative studies on distance education and traditional instruction, the most comprehensive is Russell's (1999) collection of 355, dating back to 1928, that have reviewed learning outcomes in the form of satisfaction surveys, grade comparisons, standardized test scores, frequency of interaction between learners and instructors, and a dizzying array of other measures ostensibly aimed at determining if any measurable or statistically significant differences exist.

Russell declares there is compelling evidence to support Clark's (1983) original claim that the selection of the media has little to do with learner outcomes. Further, Clark stated that, “there are no benefits to be gained from employing different media in instruction”. Based on Clark’s thinking, it would seem that the 355 reports contained in Russell’s ‘No Significant Difference Phenomenon’ have focused primarily on differences in the media rather than the methods employed
via the medium.

Spooner et al. (1999) reported that student ratings for two courses taught in both a traditional (face-to-face) and distance (Internet-based) format by the same instructor. No differences in overall course grade means of the students and in the students’ ratings of the course, instructor, teaching, and communication method were found. Schoech (2000) also reported that the satisfaction, grades, and performance of students in a semester-long graduate social work course taught in a distance format were consistent with previous outcomes in traditional courses of similar content.

On the other hand, in a survey of 250 teachers who had taught both face-to-face and online environments, Dobrin (1999) finds that “…..85% faculty felt that learning outcomes in Internet-based online education were comparable or better to those found in face-to-face classrooms. While this was consistent with much of the data that exists in support of the ‘no significant difference phenomena’, it was encouraging to see that so many faculty were in support of online courses being as effective as classroom courses.”

Rivera & Rice (2002) compared student performance of the three class
formats: a traditional class, an Internet-based class, and a hybrid class. The course offered was an introductory course in Management Information Systems, and the number of students enrolled were 41 in the traditional course section, 40 in the hybrid course section, and 53 in the web-based course section. Student performance was evaluated by comparing exam scores among three classes (exam score average- traditional class: 74.85, Internet-based class: 73.97, hybrid class: 73.35). Rivera & Rice indicated from the data collected, that there was no significant difference in student performance, regardless of the class format.

Ashkeboussi (1999) compared students’ attitudes and performance for a graduate Financial Management course, which was taught two different modes (online and traditional) of course delivery. In an attempt to overcome the shortcomings of other studies comparing different modes of education, his study designed a similar learning environment for both online (experimental) and traditional (control) groups. Over three semesters a questionnaire, addressing four major criteria or indices (Web utility, interactivity, learning experience, and overall satisfaction) that captured nineteen attributes, was distributed to both groups. After comparing the indices and analyzing the collected data, the study concluded that
there is no significant difference between the two groups of students’ attitudes and performance.

Tucker (2001) also compared traditional face-to-face education and distance education in an attempt to determine if distance education is better, worse, or as good as traditional education. Research participants were 47 students enrolled in communications class at a large urban university in North Carolina. Both classes (on-campus and off-campus) had the same instructor, studied the same course content, and used the same course materials. As the results of exams, significant differences were found for post-test scores and final exam scores. However, there were no significant differences in pre-test scores, homework grades, research paper grades, and final course grades.

Thus, this study can conclude that while distance education may not be superior to or better than traditional face-to-face education, it is not worse than traditional education. It can be an acceptable alternative because it is just as good as traditional education.
III. Methodology and Evaluative Criteria

1. Methodology

This study began with the question, “Is the Internet-based instruction better, worse, or as good as the traditional face-to-face instruction in in-service teacher training?” To answer this question, this study examines and compares the costs and effectiveness of two instruction methods: the traditional face-to-face vs. the Internet-based instruction.

Information for this report has been collected using the following sources:

◈ Florida State University Web Louis and the Worldwide Web

◈ Review of current literature and research through academic journals.

Hard copies were collected from the Florida State University using Library User Information Service.

◈ Review of KRF’s (Korean Research Foundation) reports and statistics

◈ Examination of government reports, internal documents and statistics.

Academic literature and research provided a variety of information with regard to comparative analysis of strength and weakness in a traditional face-to-face vs. Internet-based virtual classroom setting. Government and KRF’s reports
presented evaluative research data for an analysis of costs and effectiveness of two different instruction methods.

This report analyzes data obtained from an in-service teacher-training program that was conducted in an educational district of Seoul in Korea. Among the courses established in the teacher-training program, this study focuses on ‘the introductory to ICT’ course.

Participants who enrolled in the course were 80 in traditional face-to-face instruction and 108 in Internet-based instruction. Both groups of participants received 60 hours of instruction. For the face-to-face course, learners took six classes (09:00 A.M.-04:00 P.M.) a day for ten days. For the Internet-based course, learners took 60 hours of lessons through a computer network at convenient times. Learners’ log-in and log-out time was recorded. All sections cover substantially similar materials, and complete similar course contents and assignments. While the traditional class students handed in their assignments, the Internet-based class students submitted assignments by e-mail.
2. Evaluative Criteria

Cost-effectiveness analysis is designed to compare the costs and effects of two or more alternatives with similar objectives (Levin & McEwan, 2001). So, evaluative criteria for the policy options in this study should be considered in terms of costs and effects of two instruction methods: (1) Cost measures assessed in this study include personnel costs, equipment costs, facilities costs, client inputs and opportunity costs.

(a) Personal ingredients include all the human resources required for each of the alternatives (e.g., instructors, coordinators).

(b) Facilities refer to physical space required for the intervention (e.g., classroom space, computer labs).

(c) Equipment and materials refer to furnishings, instructional equipment, and materials that are used for the intervention (e.g. textbooks, CD-ROM).

(d) Client inputs include any contributions that are required of the clients (transportation fee).

(e) Opportunity costs are the value of a thing in its next best use. That is to say, opportunity costs represent the sacrifice of an opportunity that has been forgone.

(2) Learning performance as the effect of alternatives is evaluated by comparing the final exam scores between two groups.
IV. Management Policy Options

This section reviews findings and compares two possible options in order to examine which option is more cost-effective in delivering knowledge to learners. The policy options considered in this report are (1) traditional face-to-face instruction and (2) Internet-based instruction.

Each option is evaluated against the six previously discussed criteria: personnel, equipment, facilities, client input, opportunity costs, and performance (final exam scores).

1. Face-to-Face Instruction

Face-to-face instruction is traditional classroom instruction. In a traditional classroom setting, instruction is primarily teacher-centered, while Internet-based instruction is learner-centered. In addition, it has a time and place bound. So, every student should attend the class at regular times. Class schedule is arranged and determined by instructors and organization. The communication is carried out through face-to-face interaction of learners/instructors and learners/learners.
1) Cost Ingredients of Face-to-Face Instruction

This study focuses on ‘the introductory to ICT’ course of the in-service teacher training program. 80 teachers were enrolled in the traditional face-to-face class. Participants took 60 hours of training for 10 days from July 26 to August 6, 2004 in the Education Training Institute. In this section, I analyze the cost ingredients of the face-to-face instruction such as personnel, facilities, equipment, and other costs.

Personnel

The course offered was ‘the introductory to ICT’ course of the in-service teacher-training program. Four instructors taught the three sections of the course. The course was offered in a lecture/discussion format with hands-on individual and group assignment.

Each instructor taught for 15 hours in the face-to-face class. Payment by the hour for an instructor was $ 80. So, the cost of hiring four instructors was $ 4,800 (15hours×$ 80× 4 instructors). In addition, the costs for a course coordinator and a visiting lecturer were respectively $ 800 and $ 500. So, the total cost of personnel was $ 6,100 for the face-to-face course.
### Table 1: Breakdown of Personnel Costs

(Assume ₩1,000=$1.00)

<table>
<thead>
<tr>
<th>Personnel</th>
<th>Cost figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructors</td>
<td>$ 4,800 = $ 12,00 × 4</td>
</tr>
<tr>
<td>Course coordinator</td>
<td>$ 800 = $ 800 × 1</td>
</tr>
<tr>
<td>Visiting lecturer</td>
<td>$ 500 = $ 500 × 1</td>
</tr>
<tr>
<td><strong>Total cost</strong></td>
<td><strong>$ 6,100</strong></td>
</tr>
</tbody>
</table>

(Source: Korean Research Foundation)

#### Facilities

The Education Training Institute possesses two computer labs. 80 teachers enrolled in the traditional face-to-face course were divided into two classes (respectively 40 participants). They use two computer labs for 8 hours (class period: 6 hours, before and after class: respectively 1 hour) a day from July 26 to August 6, 2004. The average size of computer labs utilized by the face-to-face instruction is about 132 m². According to Sams (www.samsnet.co.kr), a property management company, the average price to lease commercial/office building in Seoul was about $ 26.2 per m² a month. The total cost to lease the space (132 m²) is $ 3,458.4 (132×$ 26.2) a month. There is about 720 hours in a month. So, the
cost per hour to lease that space is $ 4.8 ($ 3,458.4/ 720). The traditional instruction utilizes the space for 80 hours (class period 60 hours plus additional 20 hours). So, the total facility cost of the traditional face-to-face instruction is $ 768 ($ 4.8×80 hours×2 computer labs).

**Equipment**

Textbooks used in the traditional class were handouts distributed by instructors. The cost of printed materials was $ 2,250. Teachers took ‘the introductory to ICT’ course in the computer lab. A computer lab needs equipment such as computers, software, network systems, and so forth. Equipment of a computer lab in Education Training Institute is reinstalled every three years. Equipment in the computer lab has a replacement cost of $ 120,000 and a 3 year-life. When interest rate is 5 %, the annualization factor is 0.2820 and annual cost is $ 33,840 ($120,000×0.2820). The computer lab is used in eight courses a year and this course occupies two computer labs. So, for this course, the cost of hardwares in a computer lab was $ 8,460 ($ 33,840/8×2 computer labs). In South Korea, a maintenance cost is generally 10% of the total cost for equipment. So, the maintenance cost for the computer lab in the course was $ 846. The total cost for equipment utilized in the
face-to-face instruction was $11,556.

<Table 2: Breakdown of Equipment Costs>

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Cost figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textbooks and handouts</td>
<td>$2,250</td>
</tr>
<tr>
<td>Computer lap equipment</td>
<td>$8,460</td>
</tr>
<tr>
<td>Maintenance</td>
<td>$846</td>
</tr>
<tr>
<td>Total cost for equipment</td>
<td>$11,556</td>
</tr>
</tbody>
</table>

(Source: Korean Research Foundation)

**Opportunity Cost**

80 teachers enrolled in the face-to-face course should attend every class for 10 days. They receive 6 hours of instruction a day, but they spend more than 8 hours a day including lunchtime and commuting time in the traditional course. They have, on average, ten-year experience as a teacher. A teacher with ten-year experience in Korea earns an average of $100 a day (8 working hours), according to the regulation defining teachers’ wages. They forwent this revenue due to attending the class. So, the opportunity cost for teachers in the traditional course is $80,000 ($100×10 days×80 participants).
Client Input

A traffic jam in Seoul is serious. So, most citizens in Seoul commute by subway. A subway fare of Seoul is about $1.0 (one-way). Teachers enrolled in the face-to-face course should attend the class for 10 days. Attending the class for 10 days cost each participant $20 (round-trip). Therefore, the total cost of transportation in the traditional course is $1,600 ($20×80 participants).

2) Performance analysis

Learner performance was evaluated by final exam scores of learners enrolled in the traditional face-to-face instruction. The final examination was conducted via multiple-choice questions and practical technique tests after completing the course. For the face-to-face instruction, the average score of the final exam was about 90.50 and the standard deviation was about 4.09.

2. Internet-based Instruction

In recent times, with the recent growth of the Internet and other distance technologies, Internet-based course delivery has become an attractive option for
expanding the educational opportunities available to learners. Table 3 shows us what the differences are between a conventional face-to-face classroom and an Internet-based setting. Unlike the face-to-face instruction, Internet-based instruction is learner-centered and offers individualized learning over computer networks/Internet and to its advantages, reduced the amount of face-to-face between learners and instructors yet increasing the learner’s motivation through levels of interaction and communication (Woei, 2001).

<Table 3 Comparisons of Traditional and Internet-based Course>

<table>
<thead>
<tr>
<th>Setting</th>
<th>Traditional Instruction</th>
<th>Internet-based Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning</td>
<td>Teacher-centered</td>
<td>Learner-centered</td>
</tr>
<tr>
<td>Platform</td>
<td>Instructor as the main source</td>
<td>Web-based course as the source, administrated/facilitated by instructor</td>
</tr>
<tr>
<td>Lectures</td>
<td>Attend lectures for certain hours</td>
<td>Access lectures/notes through video-on-demand, presentation slides etc from Web</td>
</tr>
<tr>
<td>Hands-on</td>
<td>Attend hands-on for certain hours in laboratory</td>
<td>Self-paced (restricted to certain deadline) via the step-by-step modules on Web</td>
</tr>
<tr>
<td>Schedule</td>
<td>Arranged and determined by organization</td>
<td>Fully arranged by students but according to deadlines set by instructor</td>
</tr>
<tr>
<td>Attendance</td>
<td>Attendance taken for every lecture, hands-on and tutorial.</td>
<td>Learning is fully learners’ responsibility</td>
</tr>
<tr>
<td>Quiz</td>
<td>Sit for quiz in a location</td>
<td>Online quiz</td>
</tr>
</tbody>
</table>
Assignments | Propose sketch, endorse, execute | Propose via personal home page, endorse, execute
---|---|---
Project | Propose sketch, endorse, execute | Propose via personal home page, endorse, execute
Submission | Diskettes/print out | FTP (File Transfer Protocol) /network neighborhood
Communication | Face-to-face, e-mail | Discussion, e-mail, chat

* Source: Woei (2001), Preparing for web-based learning (http://staff.apceiu.org/)

In addition, the convenience of time and space is a big promise made by Internet-based learning. Learners do not have to physically be with the instructor in space and they do not have to be together in time as well. This is a great advantage for non-traditional learners who cannot attend at regular times. Class schedule for Internet-based course is arranged by learners but according to deadlines set by instructor. And learners communicate with instructors and one another via e-mail and web discussion board.

However, despite the promises and obvious advantages to distance learning, there are problems that need to be resolved. These problems include the quality of instruction, hidden costs, misuse of technology, and the attitudes of instructors, learners, and administrators. Each one of these has an effect on the overall quality of distance learning as a product (Valentine, 2002). Therefore, it is important to create a cost-effective Internet-based course without diminishing quality of
1) Cost Ingredients of Internet-based Instruction

The course was offered almost exclusively on the web. Course materials were offered through the Internet and the lectures were videotaped and coordinated with the lecture notes in a video-streaming format.

**Personnel**

Unlike traditional class, two instructors taught the three sections of ‘the introductory to ICT’ course though the Internet. So, the cost for instructors was $2,400 (15hours×$ 80×2 instructors). The Internet-based instruction needs higher technical support than the traditional class. It required three technical staffs for three section of the course. The cost of hiring three technical staffs for ten days was $6,750 ($6,750= $2,250×3). So, the total cost of personnel was $9,150.

<table>
<thead>
<tr>
<th>Personnel</th>
<th>Cost figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructors</td>
<td>$2,400= $12,00×2</td>
</tr>
<tr>
<td>Technical staffs</td>
<td>$6,750= $2,250×3</td>
</tr>
<tr>
<td>Facilities</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td></td>
</tr>
</tbody>
</table>

For Internet-based instruction, a server computer room is required. The size of the room is about 33.0㎡. According to Sams (www.samsnet.co.kr), the average cost to lease commercial/office building in Seoul is about $26.2 per ㎡ a month. The cost to lease the space of a server computer room is about $432 (33.0×$26.2×0.5 month).

Unlike the face-to-face course, the Internet-based course was offered almost exclusively through the Web. However, learners met once for the testing purpose. Participants enrolled in the Internet-based course were 108. For the exam, three classrooms were required. The average size of classrooms used for the exam is about 82.6㎡. The cost to lease the space of a classroom (82.6㎡) is $2,164 (82.6×$26.2) a month. Because there is about 720 hours in a month, the cost per hour to lease that space is $3.0 ($2,164/720). The exam requires three hours for taking the test and 2 hours for preparation and arrangement. The cost to lease the exam rooms is about $45 ($3.0×5 hours×3 classrooms). So, the total facility cost
of the Internet-based instruction is $477 ($432 + $45).

**Equipment**

In the Internet-based instruction, learners access lectures and notes through video-on-demand, presentation slides, etc. from Web. The cost for CD-ROMs was $3,000. The cost for the platform (including a sever-computer) was $3,410 and its maintenance cost was $341 (10% of the platform cost). The programming cost for the Internet-based instruction was $5,590. This cost includes program draft ($1,680), design ($840), production ($1,950), and revision ($1,120) costs. The Internet fee was $500. The total cost for equipment utilized in the Internet-based instruction was $12,841.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Cost figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD-ROM</td>
<td>$3,000</td>
</tr>
<tr>
<td>Platform (Sever)</td>
<td>$3,410</td>
</tr>
<tr>
<td>Maintenance</td>
<td>$341</td>
</tr>
<tr>
<td>Internet fee</td>
<td>$500</td>
</tr>
<tr>
<td>Programming</td>
<td>$5,590</td>
</tr>
<tr>
<td>Total cost for equipment</td>
<td>$12,841</td>
</tr>
</tbody>
</table>

(Source: Korean Research Foundation)
Opportunity Cost

Teachers enrolled in the Internet-based course do not have to attend the class at regular times. They can receive 60 hours of instruction at their convenient times. They can enjoy the convenience time and space. Nevertheless, in this study, assume that they forgo 60 night-working hours due to the Internet-based course. An average night-work allowance per an hour for teacher in Korea is about $10, according to the regulation defining teachers’ allowance. So, the opportunity cost for teachers in the Internet-based course is $64,800 ($10 × 60 hours × 108 participants).

Client Input

Most citizens in Seoul commute by subway. Teachers enrolled in the Internet-based course do not have to attend the class. However, the class met once for taking tests. A subway fare of Seoul is about $1.0. The cost (round trip) for each participant is $2.0. Therefore, the total cost of transportation in the Internet-based course is $216 ($2.0 × 108 participants).

2) Performance analysis
Like in the face-to-face instruction, performance of the course was evaluated by final exam scores of learners enrolled in the Internet-based instruction. The final examination was also conducted via multiple-choice questions and practical technique tests after completing the course. For the Internet-based instruction, the average score of the final exam was about 85.6 and the standard deviation was about 8.72.

3. Comparison

1) Comparison of Cost Analysis between Two Instruction Methods

Table 6 shows a comparison of cost ingredients of face-to-face and Internet-based instruction. As seen in the table, a total cost for face-to-face instruction is about $100,024, while the cost for Internet-based instruction is about $87,484. That is to say, the cost of face-to-face instruction is higher than that of Internet-based instruction. This cost difference between face-to-face and Internet-based instruction results primarily from the difference of the opportunity cost. This result coincides with prior studies (Whalen & Wright, 1999, Strother, 2002).

<Table 6: Comparison of Costs for Face-to-face vs. Internet-based Instruction>
### Cost Ingredient

<table>
<thead>
<tr>
<th></th>
<th>Face-to-face Instruction</th>
<th>Internet-based Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
<td>$6,100</td>
<td>$9,150</td>
</tr>
<tr>
<td>Facilities</td>
<td>$768</td>
<td>$477</td>
</tr>
<tr>
<td>Equipment</td>
<td>$11,556</td>
<td>$12,841</td>
</tr>
<tr>
<td>Client Input</td>
<td>$1,600</td>
<td>$216</td>
</tr>
<tr>
<td>Opportunity Cost</td>
<td>$80,000</td>
<td>$64,800</td>
</tr>
<tr>
<td>Total Cost</td>
<td>$100,024</td>
<td>$87,484</td>
</tr>
<tr>
<td>Cost per Learner</td>
<td>$1250.30</td>
<td>$810.04</td>
</tr>
</tbody>
</table>

(Source: Korean Research Foundation)

The cost per learner for Internet-based instruction is lower than face-to-face instruction. Unlike face-to-face instruction, Internet-based learning is not restricted by time and space. So, Internet-based instruction can accept more learners than face-to-face instruction. The more participants, the less a cost per learner for Internet-based instruction.

### 2) Comparison of Performance between Two Instruction Methods

Learner performance was evaluated by comparing exam scores between two classes. The goal was to determine if there were significant differences in the performance between two classes. Testing was accomplished via multiple-choice
exams and practical technique tests after completing the course.

**Table 7: Comparison of Average Scores for Face-to-face vs. Internet-based Instruction**

<table>
<thead>
<tr>
<th>Course type</th>
<th>Average score</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face Course</td>
<td>90.50</td>
<td>4.09</td>
</tr>
<tr>
<td>Internet-based Course</td>
<td>85.60</td>
<td>8.72</td>
</tr>
</tbody>
</table>

(Source: Korean Research Foundation)

Table 7 displays a comparison of average scores of face-to-face and Internet-based instruction. As seen in the table, the result reveals that Learners in the face-to-face course have a little higher average exam score than those in the Internet-based course.

However, while each course used similar course materials, contents and assignments, different instructors taught the courses. Obviously, each instructor would place emphasis on different topics and conduct the class in a slightly different manner. However, the instructors’ previous experience in covering concurrent sections of this class tended to minimize the differences in instructional approaches, but does not totally eliminate them. Therefore, it is possible that this had some impact on the results of this study.
V. Conclusion

The report analyzed and compared the costs and effectiveness of two possible options. Each policy option was evaluated based on personnel, equipment, facilities, client input, opportunity costs, and performance.

As mentioned above, this study reveals that the cost for Internet-based instruction is less than the face-to-face instruction, while the final exam score of the face-to-face instruction is a little higher than that of the Internet-based instruction. However, in terms of learner performance, we cannot conclude that there is a significant difference between two instruction methods, because different instructors taught the courses. In addition, only two groups were compared as part of this analysis and there may be some selection bias. Each of these may affect the result of this analysis.

In this 21st century, individuals and corporations cannot have a bright future if they don’t know how to use computers and the Internet appropriately (NCA, 2000). The development of Internet technology is reshaping the existing education system of South Korea that has used standardized textbooks and identical instruction methods. Recently, South Korea aims at creating Edutopia, a lifelong
learning society. For this aim, a creative and self-directed education method is required. Internet-based instruction is learner-centered and offers individualized learning over computer networks/Internet. However, in spite of obvious advantages of distance learning, there are various problems that need to be resolved, such as the quality of instruction, hidden costs, and misuse of technology.

Therefore, the best use of new technology in education currently is as an enhancement rather than a replacement of traditional instruction. When done effectively, the Internet-based course will allow self-paced learning and the role of instructor to change from “guide by the side” to “guide behind the screen”-independent learning (Woei, 2001).

Both face-to-face and Internet-based instruction methods are used today in educational programs. Leung and Tran (2000) indicate that the advantages of face-to-face and distance learning methods complement each other. So, with the increase in the use of information technologies for distance learning, educational programs use a blend of both methods in order to maximize the advantages and minimize the disadvantages of each.
REFERENCES


Strother, J. (2002). An assessment of the effectiveness of e-learning in corporate training programs. *International Review of Research in Open and Distance Learning, 3*(1)


