ISSUES OF INTERNATIONAL DISTANCE LEARNING: LESSON LEARNED FROM THE EXPERIENCE OF OSAKA UNIVERSITY

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to introduce the

Abstract
This paper presents an international distance learning project currently being conducted between Japan and Thailand, which is named as “HIT Project on Distance Learning from Osaka University to SIIT, Thammasat University”. Osaka School of International Public Policy (OSIPP) and the Cybermedia Center, Osaka University, broadcasted two series of 12 televised lectures to the Sirindhorn International Institute of Technology (SIIT), Thammasat University, Thailand from June 27 to October 3, 2002, and from June 19 to September 18, 2003, via KDD's international ISDN (128kbps). Two educational institutions transmit voice and moving video signals together with interactivity on a real time basis by using ViewStation SP manufactured by Polycom. A course titled “IT (Information technology) and Its Application” in two series of twelve sessions has been offered, which covers the applications of information technology in engineering and social sciences. Each session lasts ninety minutes. Thirty-one in 2002 and sixty in 2003 junior and senior SIIT students majoring in electronic engineering participated in the lecture series, and two courses were counted as regular units in SIIT. This project is not experiment, but actual implementation. The goal of this project is two-fold: start-of-the-art research and development in Japanese information technology; and to promote the IT development in Thailand, especially in the education of specialists in communication and broadcast.

By examining this project as a case study, we analyze the issues of international distance learning and attempt to formulate effective methods of international distance learning from the viewpoints of technology and teaching. Regarding the former, the Internet becomes a popular method for international distance learning. But, when making a comparison of ISDN with the Internet, we find that the superiority of either depends upon the existing infrastructure and service charges of transmitting and receiving countries. Among developed countries, the Internet is considered a much better technology in terms of not only charges, but also speed. But, when one side of the partner is a developing country, the situation can be entirely different. The slow speed and narrowband of the Internet did not suit distance learning, since problems such as stoppage of motion pictures oftentimes occur. ISDN, on the other hand, secures transmission, despite the slow speed and narrowband. In this paper, we present how issues related to slow speed of ISDN are solved by the construction of the system
configuration and the method of teaching.

1. Introduction

In collaboration with the Graduate School of Information Science and Technology, Osaka School of International Public Policy and the Cybermedia Center, Osaka University transmitted a series of lectures to the Sirindhorn International Institute of Technology (SIIT), Thammasat University, Thailand from June 27 to October 3, 2002, using the teleconference system via international ISDN. The lectures covered the applications of information technology (IT) in the fields of engineering and the social sciences. The object of this project is two-fold: (a) to introduce the state-of-the-art research and development in Japanese information technology; and (b) to promote IT development in Thailand. The project particularly focuses on nurturing IT experts in the fields of telecommunications and broadcasting. The project is supported financially and technologically by three Japanese grant-making foundations -- the Hoso-Bunka Foundation, Inc. (HBF), the International Communications Foundation (ICF), and the Telecommunications Advancement Foundation (TAF). HIT is the abbreviation derived from the first letters of these three organizations.

Sirindhorn International Institute of Technology (SIIT) was jointly founded by the Japanese Business Federation and the Federation of Thai Industries in 1992. The mission of the institute is to train engineers for international enterprises, corporations and organizations. Its faculty is therefore internationally mixed and courses are conducted in English. In 1996, the king of Thailand bestowed the name “Sirindhorn” to the school. Sirindhorn is the name of the princess who has strong interest in science education. The enrollment of SIIT in 2001 was 1,557.

This international distance learning effort was a process of trial and error, and concerted efforts had to be made to resolve issues encountered. As a result, we are convinced that a prototype of the distance learning program of Osaka University, such as contents and know-how of tele-education, was established. This paper presents the process of trial and error in resolving the issues. The distance learning of this project provides many suggestions for future implementation of international distance learning using ISDN.

2. Outline of the Project

This project was subsidized by and received the cooperation of the three HIT foundations, and the term of the project is two years. This paper presents the activities undertaken by the project in 2002.

(1) Purpose

The purpose is to provide lectures to Thai students to instruct them about the current situation of IT and its application in various fields in Japan. In so doing, the project is aimed to support human resource development in the fields of broadcasting and telecommunications.

(2) Period

From June 27 to October 3, 2002.

(3) Students

Thirty one junior and senior university students majoring in electronic engineering at SIIT, Thammasat University, Thailand.

(4) Lecturers and lecture contents

Instructors consisted of professors of the Cyber Media Center, Graduate School of Information Science and Technology, OSIPP, and lecturers of telecommunications carriers. They taught 12 lectures in total, once a week every Thursday from 5:00 pm (3:00 pm in Bangkok) for 90 minutes. Seven lectures were related to IT, and 5 to the application of IT to the social sciences. The lectures were treated as regular lectures at SIIT, and SIIT admitted credits as official units. Examinations were carried out at SIIT.
(5) Equipment

The TV conference system called ViewStation which is manufactured by Polycom, has been utilized at the Cyber Media Center. The lectures from Japan to Thailand were transmitted via the international ISDN of KDDI, a prominent Japanese telecommunications service provider with a line speed of 128Kbps, in real time and on an interactive basis. Lecturer-student interaction was possible, e.g., questions raised by the students in Thailand could be answered immediately by the lecturers in Japan. In Thailand, SIIT received images of the lectures by the same Polycom ViewStation which was donated by HIT.

3. Contents of Lectures

The detailed contents and dates of the lectures are shown in Table 1. The first lecture presented on June 27 was preceded by an opening ceremony during which the president of Osaka University and the rector of Thamassat University, the director of SIIT, and the delegates of HIT presented keynote speeches. The lectures were also transmitted within Osaka University through the internal LAN, and other departments were welcomed to view them.

4. Distance Learning System

4.1 Videoconference system

(1) Main equipment, Videoconference system (ViewStation, Polycom)

The main system utilized is a videoconference system called ViewStation, manufactured by Polycom. The SP type of ViewStation was used, which is suitable for conducting a videoconference with a small number of participants. The same equipment which was donated by HIT was installed at Thammasat University. ViewStation SP consists of a main body, a camera installed in the main body, a microphone, and a remote controller. ViewStation can be controlled by a remote controller.

Table 1  Schedule and Contents of Lectures

<table>
<thead>
<tr>
<th>Session</th>
<th>Date</th>
<th>Contents</th>
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<tbody>
<tr>
<td>1</td>
<td>6/27</td>
<td>Opening Ceremony and Orientation for Lectures</td>
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<tr>
<td>2</td>
<td>7/4</td>
<td>Congestion Control Algorithm of TCP in the Internet</td>
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<tr>
<td>3</td>
<td>7/11</td>
<td>Virtual Reality / Mixed Reality</td>
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<td>4</td>
<td>7/18</td>
<td>Remodeling of Osaka University Campus Network: A Solution for Bandwidth and Security</td>
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<tr>
<td>5</td>
<td>8/1</td>
<td>The Physics of the Web•Small-World Networks and Internet Flow</td>
</tr>
<tr>
<td>6</td>
<td>8/15</td>
<td>Performance Evaluation of Computer Networks: Theory and Practice</td>
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<tr>
<td>7</td>
<td>8/22</td>
<td>Mobile Multimedia Services and Technologies on Mobile Phones I Japan</td>
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<tr>
<td>8</td>
<td>8/29</td>
<td>Latest Wireless Access Technologies</td>
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<td>9</td>
<td>9/5</td>
<td>The Digital Continent: A Planet of Apes?</td>
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<td>10</td>
<td>9/12</td>
<td>Convergence of Broadcasting and Telecommunications</td>
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<td>11</td>
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<td>e-government</td>
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<td>12</td>
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<td>e-commerce</td>
</tr>
<tr>
<td>13</td>
<td>10/3</td>
<td>Application of IT for Medicine and Education</td>
</tr>
</tbody>
</table>
(2) Camera (installed in main body)
A camera is installed in the main body, and designed to be able to catch a wider view including the participants of videoconference. The camera has a zoom function, therefore a wider view can be transmitted. The angles of the camera can be set before the lecture, and selected automatically by the controller (See Figure 1).

(3) Microphone
ViewStation SP is best suited for videoconferences involving a small number of people, who can speak into the microphone from a certain distance. The microphone moves automatically to the person who is speaking.

(4) Speaker
There is no speaker installed in the main device of ViewStation SP, so the speaker of the television set is utilized. The students in the classroom are able to hear the voice of the person speaking. This distance-learning program had the participation of approximately 30 students so the volume was set at the maximum level.

4.2 Telecommunications network
This distance learning program utilizes NTT’s PSTN inside Japan, and KDDI’s ISDN for the international network with a speed of 128kbps. The campus of Thammasat University was not equipped with ISDN, so SIIT applied for ISDN to the Telephone Organization of Thailand (TOT) at its own expense. If lecture documents are prepared so as to fulfill their functions, quite satisfactory results can be achieved in international distance learning over ISDN circuits even at a low speed of 128kbps since the movements of the lecturers are usually minimal while speaking.

4.3 System configuration
After examining several methods of transmission of images of lecture materials during instruction, the following method was finally adopted: The images were projected by an LCD projector onto a screen at Osaka University, which was recorded by a ViewStation camera, and then shown on the television at SIIT. At the beginning of the lecture series, the room at OSIPP was kept dark in order to see the screen images clearly, but this made it difficult to see the lecturer’s face. After the ninth lecture, the screen was replaced with a plasma display. [Figure 2]

5. Evaluation of the Project
In order to obtain the students’ evaluation about the contents of the lecture and the technological environment, a questionnaire was circulated to the students after each lecture. In what follows, we summarize the evaluation by SIIT professors, who attended each lecture, and the students.

5.1. Overall evaluation
(1) Lecture themes and contents
(a) Students satisfaction
Students were in general satisfied with both themes and contents, and gained a good understanding of the current IT in Japan. Professors of SIIT, who participated in all lectures, evaluated the lectures highly, and provided comments such as they being useful for the students to broaden their views.
(b) Contents of the lecture
According to their evaluation, the level of each lecture was appropriate and their themes were well-selected. Some lectures, however, were mismatched with the demand of the students. As for such themes, improvements were requested for next year.
(c) Balance in the field
The balance between technology and the social sciences seemed to be appropriate.

(2) Voice and image
As for voice and image, many problems existed which were mainly technological, as described in what follows in the earlier lectures. The quality of voice and image were improved by some modification in later ones.
(a) OSIIP side
The microphone of ViewStation was an obstacle throughout the lecture series, and a source of trouble. In the beginning, we relied on its “high quality” as claimed in the brochure of Polycom which was accepted at face value. However, it proved that unless the lecturers spoke from a set distance into the microphone and from a set direction, the sound became extremely distorted. Especially, it was found that this problem became even more serious when lecturers spoke while they were moving with the microphone in hand.

In a relatively large classroom, the echo canceller function did not work well. In addition, sometimes it was very difficult for the students to hear in Thailand. The only resolution at that time was to ask the instructors to speak toward the microphone from a set distance and from a set direction.

After the ninth lecture, we changed from the microphone attached to ViewStation to a headphone set. From then on, voice quality showed improvement, according to a Professor at SIIT who participated in the lectures. Classrooms at OSIPP are not soundproof, which resulted in the microphone catching all kinds of sounds, and this caused the bad quality of sound at SIIT. Thus, issues related to sound and microphone have not yet been fully solved, and they have to be examined in the second year of the project.
(b) SIIT side
Regarding sound, the classroom at SIIT is also a factor for the poor sound quality. Because they used microphones installed in the television set, in a large classroom with many students, the louder the voice, the worse the quality of sound.
(c) Images
For the lectures, not only the images of the instructors but also that of the lecture materials were taken by one ViewStation camera. Due to this, once the instructors moved, images of the latter shook. If we had two cameras, one could take the images of the lectures, and the other lecture materials. There is, however, only one outlet for voice, so it is impossible. The only solution for this seems to be showing the lecture materials by a projector which are transmitted to SIIT via the Internet prior to the lecture. This is the most important issue to be resolved for this year’s distance learning program.
5.2 Questionnaire to students

After each lecture, questionnaires were distributed to the students who evaluated the lectures. Students were asked to reply either “Very Good,” “OK,” or “To be improved”. We provide 2, 1, and 0 for the above replies, respectively. According to this framework, we examined the students’ replies.

(1) Theme and interest
The average was 1.4, which is quite high, and this implies that students were interested in the lecture series.

(2) Lectures
Average was 1.1.

(3) Level of lecture
Average was again 1.1.

(4) Instructors’ English
Some comments indicated that the instructors had Japanese accents, which hindered the understanding of the lectures.

(5) Explanation of the lecturer
High average of 1.2.

(6) Question and answer
High average of 1.2, even though there were few questions raised in the classroom.

(7) Overall equipment
Average was 1.1. Some lectures had a quite low score regarding images and voice. Without these lectures, the average would have been higher.

(8) Still pictures
Average was a rather low 0.9. This is due to the fact that some instructors moved a lot during the lecture.

(9) Motion picture
Average was rather low 0.9. As long as Polycom’s Viewstation is used, this issue is inevitable.

(10) Sound
Average was approximately 1.0, which was rather higher than expected. Since switching from Polycom’s microphone to a head set, the quality of sound improved greatly.

(11) Timing of sound and images
Average was 1.3, which is quite high.

(12) Overall satisfaction
Average of overall evaluation was 1.1, which is quite satisfactory for us. Each lecture received almost the same evaluation.

6. Issues to be resolved

After completing the lectures, OSIPP and SIIT held an online meeting. We discussed the students’ evaluation, and how to improve the lecture series. The issues for the second year of the program are summarized as follows:

(1) Rearrangement of contents
The second year will also focus on IT, and SIIT wished to increase the number of students majoring in IT. Efforts will be made to meet the desires of the students regarding contents.

(2) Images
We have to utilize the existing facilities, and under these circumstances we will make the best effort to increase the quality of images. From the experience of the first year, lecture materials should be prepared using a larger font for PowerPoint and sent to SIIT prior to the lecture.

(3) Sound
Further efforts are required to improve the quality of sound by making use of a better speaker as well as microphone. Especially, a budget should be allocated to purchasing the former.

(4) Telecommunications network
After the lectures were completed, we were informed that the capacity of the Internet network between Japan and...
Thailand had been improved, and an experimental test for transmission was conducted on October 31. However, this ended in failure, and the main reason was that the speed of LAN inside Thammasat University had not been improved. For the moment, there is no plan to improve the capacity of its LAN. Therefore, we learned that in the second year ISDN must again be utilized.

References


Figure 2  System Configuration