

Human Resources Development with Information Technology

Simultaneous Satellite Lecture Provision for Tokyo Institute Technology and Asian Institute Technology

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Abstract

In 1996 Tokyo Institute of Technology (Tokyo Tech) introduced Academic Network for Distance Education by Satellite (ANDES) system to promote active exchanges of lectures among universities in Japan. Since the last decade, higher educational institutions in different region of the world have been moving fast to collaborate each other through various kinds of tools and methods of distance education. With the development in information technology in education, more and more international exchanges and innovative cooperation among institutions have become possible. In 2002, as one of international collaboration scheme, Tokyo Tech started to provide lectures via satellite to Asian Institute of Technology in Thailand. The paper highlights four characteristics of this new collaboration: 1) providing graduate level lectures currently taught in Tokyo Tech via satellite to AIT; 2) coping with difference in education system; 3) integrating into local education system; and 4) providing systematic monitoring system. The project is currently in a pilot phase and has received initial feedback from the receiving institutions and students. The monitoring exercises provided useful information to suggest key elements for successful satellite lecture provision.

1. Introduction

Higher educational institutions are now moving fast to collaborate each other through various kinds of tools and methods of distance education. With the development in information technology, more and more international exchanges and innovative cooperation among institutions have become possible. Its active application in education field is evident. In order to promote collaboration among universities and research institutions, distance education has become active part of Japanese higher education with the use of satellite lectures and web-based learning.

New partnership of distance education program has been expanded to overseas. Asian e-Learning Network 2002 identifies five major international collaborations with particular emphasis on various methods to promote e-Learning.¹ The purpose of these new collaborations is to identify and promote cooperation in research and educational activities among Japanese universities and higher educational and research institutions in Asia. With introduction of latest information and communication technology, the program aims at promoting new types of collaboration among researchers, as well as teachers and students between institutions.

Furthermore, recent progress in information communications technology is considered significantly affect every country and society in the world, and also to be an extremely important driving force for the global economy. Promoting capacity building in science and fostering superior human resources by using IT effectively, can be powerful means to solve various

¹ Asian e-Learning Network 2002 Conference was held in Tokyo in July 2002 with sponsorship of the Ministry of Economics and Industries of Japan. Five projects include "Malaysia-Japan e-Learning Network Project" (Kyoto University, Waseda University and Multimedia University), "International Experiment Project of Asynchronous Collaborative-learning Method" (Aoyama Gakuin University and De La Salle University), "Issues around E-government and E-commerce in Singapore and Japan" (Tokyo University, Nanyang Technological University and National Institute of Multimedia Education), "Synchronous and Asynchronous Distance Education of Graduate Programs between AIT and Tokyo Tech" (Tokyo Institute of Technology, National Science and Technology Development Agency, and Asian Institute of Technology), and "Network Campus Initiative for Asia e-Learning" (Hanoi Technological University and Keio University).

socioeconomic issues in respective countries and to realize sustainable growth as well.

In this context, Tokyo Institute of Technology (Tokyo Tech) established a new international collaboration with Asian Institute of Technology (AIT) to promote learning and teaching with the introduction of information technology. The paper intends to 1) give background information on collaboration between Tokyo Institute of Technology and Asian Institute of Technology, 2) highlight some of the characteristics of this new collaboration, 3) summarize preliminary result of evaluation of the program, and then 4) share lessons learned for the future development of the project with particular emphasis on local context.

2. Background

A. Trend in Human Resources Development in Asia

Industrial countries in Asia such as Thailand, Indonesia and the Philippines, face the demand to develop higher education in the field of science and technology. Each government established new graduate schools to produce highly technical graduates to meet the demand of domestic market. At the same time, however, these universities face difficulty in providing highly advanced courses from financial and human resources development perspectives. Often cases, they depend on experts from external research agencies and guest speakers as well as invited lectures from foreign universities. Higher educational institutions in these countries are requested from the less developed neighbouring countries such as Laos and Cambodia to provide technical assistance to develop human resources for their countries.

Given this background, universities in US and European countries have been cooperating with universities in Asia. They actively experiment new types of international programs and collaborative programs such as satellite lectures, joint management of graduate schools and branch campus. Recent new collaborations represent different forms of educational services provided at the recipient institutions, rather than inviting and educating foreign educators at host nations. Japanese higher education institutions have been formulating and experimenting lecture provision to foreign universities in Asia. However, these experiments are often single course at the trial base and sustainability of the program is in question. Shortcomings of these experiments are identified as lack of local coordination and systematic monitoring capacities. In other words, the past experimental program did not offer local support system to integrate into education systems of the recipient countries. It is repeatedly mentioned that systematic support from both

technical and personnel perspectives on both sides is a key to the success of such international collaboration.²

B. Partner Organizations in Thailand

In organizing and implementing this new international collaboration project with Thailand, there are two major partnerships. The first partner organization, National Science and Technology Development Agency of Thailand (NSTDA) has three research institutions on Information Technology, Biotechnology and Material Science. NSTDA professionals serve as lectures at different higher educational institutions and actively organizing university alliances in Thailand. At the beginning of 2002, NSTDA moved to Science Part outside of Bangkok. Tokyo Tech established its first overseas office, Tokyo Tech Office in Thailand, in October 2002.

The other important collaborative institution, AIT was established as South East Asian Treaty Organization (SEATO) Graduate School and has a history of 40 years. It is an international graduate school and currently over 1400 students from countries and enrolled. Courses are taught in English. AIT consists of four graduate schools. Satellite lectures from Tokyo Tech are transmitted to the School of Advanced Technologies (SAT)

C. Distance Education Activities and International Graduate Program at Tokyo Tech

In 1996, Tokyo Institute of Technology introduced Academic Network for Distance Education by Satellite (ANDES) system to promote active exchanges of lectures among universities in Japan. Since 1989 Tokyo Tech started to exchange lectures with Hitotsubashi University. This ANDES system assisted to reduce staff time to participate in this cooperation program since lecturers do not have to move between two institutions. Lectures have been conducted using real-time two way communications by MPEG2 video format. At the same time, this system is fully used to promote continuing education in the society. In this program, Tokyo Tech's graduate level courses are provided via satellite and the adult learners are able to receive appropriate credits. Further, in 2002, Tokyo Tech started the Higher-School University Collaboration Project via Communication Satellite. Lectures are transmitted to high schools and technical colleges in Japan based on regular courses of Tokyo Tech. The students in technical colleges receive credits.

International Graduate Program was established in 1993. All the courses are offered in English in seven fields and thus, Japanese is not required to be enrolled in the program. Each year a total of 35 graduate students are enrolled from different regions. Two courses offered at AIT are the part of this International Graduate Program. This means that the lectures to offer these courses are

² Proposal paper of Tokyo Institute of Technology submitted to the Ministry of Education and Sciences on April 19, 2002.

experienced to provide lectures in English and that they are active in interacting with students from different environment.

3. New Collaboration with Information Technology in Education

New collaboration started among Tokyo Institute of Technology (Tokyo Tech), National Science and Technology Development Agency of Thailand (NSTDA), Asian Institute of Technology (AIT) in April, 2002. This project completed the first pilot phase. Four characteristics are identified in the following aspects: 1) providing lectures currently offered at Tokyo Tech to AIT via satellite; 2) coping with difference in education system; 3) integrating into local education system; and 4) introducing systematic monitoring system.

1) *Providing lectures currently offered at Tokyo Tech to AIT via satellite* The first pilot phase of the project offered two graduate level courses currently taught at Tokyo Tech to AIT via satellite. These courses, “VLSI Design Methodologies” and “Advanced Signal Processing” of the Graduate School of Engineering are selected with a request of AIT. Both are highly advanced courses taught in English as a part of International Graduate Courses of Tokyo Tech. Students at AIT receive these lectures at satellite classroom at the same time graduate students at Tokyo Tech participate in class on campus in Tokyo with two hours of time difference. Lectures offered at Tokyo Tech at 11:00 am can be received at 9:00am in Bangkok as the first class period of the day. At the end of 90minutes lectures, students at AIT can interact with professors via individual microphone during question and answer period. Additional questions can be answered by local lecturers and teaching assistants assigned to each course at AIT. Lectures received at Asian Institute of Technology become formal credits of students of AIT.

2) *Coping with differences in education system:* Tokyo Tech and AIT follow different academic calendar, and thus, arranging class schedule is a major challenge. The difference in system to provide each course is evident between two institutions. For example, Tokyo Tech’s new term starts on the second week of April and will continue to the end of July for 14 weeks. On the other hand, AIT’s spring term begins on the second week of May and will continue for 12 weeks. Tokyo Tech will provide 2 credits for each course for 22 hour-lectures. This is to meet in a classroom once per week for 90-minute-lecture for 14 weeks. AIT’s regular course provides 36 hour-lectures for meeting three hours per week for 12 weeks. AIT students receive 3 credits per course. In order to cope with these differences, three additional methods were integrated into local system: 1) AIT will provide additional lectures by the local counterpart lecturers (CP); 2) AIT students are required to participate in experiments and

regular discussion sessions with teaching assistant (TA); and 3) Tokyo Tech’s lecturers visit AIT twice to give intensive face-to-face lectures to students at the beginning of the course and in the middle of the term. Further, all the lectures at Tokyo Tech are kept in videos and CDs for easy review for the AIT students.

3) *Integrating into local education system:* This new collaboration emphasizes on how courses of Tokyo Tech can be integrated into local education system of AIT. In order to promote localization, three key activities can be highlighted. First, as for qualification of the lectures of Tokyo Tech, AIT’s Qualification Committee examines and approves Tokyo Tech’s lectures. This is important since the Tokyo Tech’s courses provided to AIT become the official credits of the AIT and serve as a part of graduate degree requirement. Once AIT’s Qualification Committee approves Tokyo Tech’s lecturers, they receive the title of Adjunct Professors of AIT.

Second, prior to the lectures two institutions discuss and decide on what kind of courses should be provided at AIT. This is done by analyzing the demand of the students as well as the human resources available at AIT. Once AIT identifies the necessary courses, Tokyo Tech searches the best match of its demand from International Graduate Courses of the current academic year. It must be emphasized that this is not to provide custom made lectures only to serve for AIT but to share official courses taught at Tokyo Tech’s graduate school. This is meaningful in a sense that the courses to be taught at AIT are officially accredited by the Japanese Higher Education system and that these courses are evaluated by the students of Tokyo Tech annually. In other words, quality of the course content is systematically checked and evaluated and thus, this system can serve as a mechanism of quality control. In this sense, this collaboration is a new experiment of its kind.³

Third, as mentioned earlier, in order to provide localized education, AIT matches local counterpart lecturers and appropriate teaching assistants. It is often discussed that lack of communication between teachers and students can hamper the effectiveness of teaching in highly advanced courses. To cope with this possible problem, students are free to contact local lecturers for questions on the content of satellite lectures and advices for their research activities. Local counterpart lecturers keep close contact with Tokyo Tech’s professors through face-to-face meetings and via frequent e-mail and fax communications. Following each satellite lecture, teaching assistant organizes the experiment sessions and/or discussion sessions whichever appropriate.

4) *Introducing systematic monitoring system:* The first three months of new collaboration served as the first pilot phase of the project. Active feedback from the recipient of the courses would serve as important

³ Currently, there are request on courses such as “Wave Theory”, “Bioinformatics” and “Environmental Engineering”.

inputs for further development of the collaboration. In this context, monitoring exercises introduced four types of questionnaires and interviews with students, lecturers and others who are actively involved in this program. Four types of questionnaires include: 1) general survey; 2) weekly survey; 3) technical evaluation on satellite lectures; and 4) face-to-face interviews.

The general survey was conducted at the beginning of the course to gather background information of the students. The weekly survey aims at collecting information on the study habit and life on campus in general. This questionnaire consists of 23 questions regarding preparation for the course and review activities, communication with lecturers and teaching assistants, as well as weekly schedule of the students.⁴ The technical survey was conducted in the middle of the term to evaluate the quality of the satellite lecture systems. This questionnaire includes 25 questions covering aspects of quality of overall television screen, transmission of pictures and sound, sense of involvement, quality of question and answer period and so on.⁵ Further, face-to-face interview with students was conducted in early August to receive direct feedback on overall satellite lecture program.

4. Major Findings

Active feedback from the students and recipient institutions provided useful information. Technically speaking, students' feedback was generally positive. It should be noted, however, that compared with face-to-face lectures, students are required to have additional concentration during the satellite lectures. Major findings are listed as follows:

1. *Satellite lecture provision is useful in highly advanced areas of specialization:* Students' survey indicated that majority were interested in taking this course since advanced lectures in this area is not provided at the local institutions. They felt that it is advantageous to learn from the foreign professors via satellite lecturing to enjoy international environment. Some responded that it was almost exciting to receive same lectures at the same time that the students in Tokyo learn 4,000km away. It was also mentioned that more active interaction among students would make the satellite lecturing more attractive.

2. *Technical aspect of the lecture provision can be improved, particularly in terms of two-way communication:* Majority of the students requested in technical survey as well as weekly survey that they wish to have more active communication with Tokyo side via

satellite. Due to limited lecture time, currently, question and answer period is limited to the last 10–15 minutes. Interactive communication via satellite sometimes takes more time due to the condition of the microphone and sound system.

3. *Combination of face-to-face communication and satellite lectures serves students better:* Majority of the students appreciated direct communication with lecturer before the start of the course and in the middle of the course. This method was effective for the students to feel strong sense of involvement even though they could not meet with Tokyo Tech's lecturer on regular bases. Further, frequent discussion and group activities with teaching assistant made the students feel close to each other. This assisted students to motivate themselves to learn and continue to participate in satellite lecture course. It is certain that close communication among local lecturers, teaching assistants and student improved the students' study habit. This contributed the satellite courses to be integrated into local educational activities at AIT.

4. *Development of effective e-learning materials would be the key to the success of students learning:* Weekly survey found that students spent two hours on average per week to review the satellite lecture. Main methods of review included small group discussion and personal discussion with teaching assistant of the course. In addition, students actively used web based materials prepared by the lecturers. The lecturer who taught one of the satellite courses mentioned that he spent quite a long time to prepare the e-learning materials to assist students learn better. It was particularly important since lecture recognizes that satellite lecturing allows less contact of the students compared with the face-to-face lectures, and thus, development of "easy to learn materials" has become even more important.

5. *Satellite lecture provision contribute lectures to improve their teaching:* Further, it was found that students spent about 90 minutes to prepare for each lecture. During the course of satellite lecture provision, students highly requested that lecture note should be provided to them in advance. According to the lectures, they felt that this would contribute lecturers to improve own lectures by preparing and polishing their lecture notes in advance. This would well be a part of their faculty development.

5. Concluding Remarks

Although it is still a pilot phase of the project, active feedback of the students of the recipient institution provided useful and insightful inputs. Satellite lectures can be useful to provide advanced knowledge that is otherwise unavailable at the recipient institution. At the same time, face-to-face communication and systematic local support was found crucial for the student to learn effectively. Feedback from the students highlighted the importance of balance between synchronous and

⁴ General Survey and Weekly Survey were developed by the project team of Global Scientific Information and Computing Center, Tokyo Institute of Technology.

⁵ Technical Survey was produced by Center for Research and Development of Educational Technology, Tokyo Institute of Technology.

asynchronous approaches to learning. It should be also noted that lecturers of Tokyo Tech considered this opportunity to improve their teaching. Since lecturers receive continuous feedback from the students, they could act quickly to improve some of their teaching methods. Further, web-based learning materials served as an effective tool to support satellite lecture every week. Lecturers also could improve the materials to put on web based on inputs from the students as well as local counterpart lecturers and teaching assistants.

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References

Farrell, Joseph, and Oliveira, Joao, eds. (1993). *Teachers in Developing Countries: Improving Effectiveness and Managing Cost*, Washington, D.C.: Economic Development Institute.

Guri-Rosenblit, Sarah. (1999). *Distance and Campus Universities: Tensions and Interactions/A Comparative Study of Five Countries*, IAU Press.

Latchem, Colin. (1998). *Distance and Flexible Learning Technology: The Australian Experience*.

Ministry of Information and the Arts. (2002). *Singapore 2000*.

Ministry of Public Management, Home Affairs, Posts and Telecommunications. (2001). *Information and Communications in Japan White Paper 2001*.

N National Institute of Multimedia Education (1999). *Information Revolution in Japanese Higher Education*, International Symposium, Tokyo.

P Porter, Lynne R., Colin Latchem. (1997). *Creating the Virtual Classroom: Distance Learning with the Internet*, New York: John Wiley & Sons.

T Thompson, Melody M. et al. (1998). *Distance Learners in Higher Education*, Atwood Publishing.

T Tokyo Institute of Technology. (2002). "Creating Overseas Offices to Promote International Collaboration," Project Proposal submitted to the Ministry of Education, Culture, Sports, Science and Technology of Japan.