Development of Synchronous and Asynchronous Distance Education:

Collaborative Learning with Local Context

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Introduction

Recent development of information technology has been influencing upon the modes and systems to provide services in different fields. 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. For example, Four University Alliance Program aims at exchanging lectures of field of expertise of four national universities in Tokyo.[28] Each university provides lectures of its strong field. Students are able to participate in classes in three other alliance universities via satellite lecture system and receive credits for its own university degree program.

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.[29] 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. Tokyo Institute of Technology established a new international collaboration with Asian Institute of Technology 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.

Background

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 of providing highly advanced courses from financial and human resources development perspectives. Often cases, they depend on experts form 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, higher educational institutions in the US and European countries have been cooperating with universities in Asia. They actively experiment new types of international programs and collaborations such as satellite lectures, twinning programs, 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.[30]

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 Institute of Technology to Asian Institute of Technology via satellite. These courses, "VLSL 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. Tokyo Tech lecturers send the grades to AIT and local lecturers finalize the grade for each AIT student for credit.

2. Coping with differences in education system

Tokyo Tech and AIT follow different academic calendar, and thus, arranging class schedule is a major challenge. As shown in Figure 1, 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.

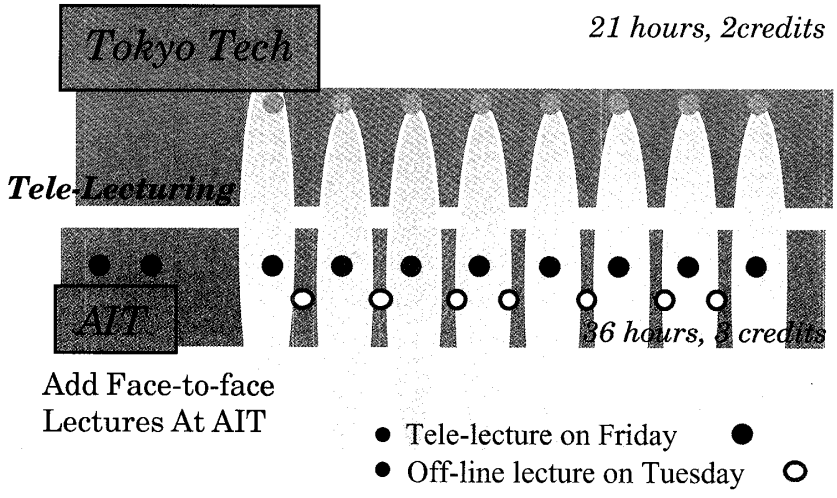

Figure 1
Coping with difference in academic calendar. *Global Scientific Information and Computing Center, Tokyo Institute of Technology.*

3. Integrating into local education system

This new collaboration between Tokyo Tech and AIT emphasizes on how courses of Tokyo Tech can be integrated into local education system of AIT. In order to promote localization, four 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, and 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. At the same time, lecturers to provide satellite courses are motivated to improve his/her own teaching since own courses are contributing to education system internationally. In this sense, this collaboration is a new experiment of its kind.[31]

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. Students are encouraged to contact teaching assistants to small group sessions for preparation and review of the lectures.

Fourth, in order to serve better and more efficiently, Tokyo Tech establishes "Tokyo Tech Office (Thailand)", a local liaison office in Bangkok.[32] Tokyo Tech Station aims at 1) coordinating satellite lectures, 2) promoting collaborations in research and

education, 3) monitoring the programs, and 4) publicizing the cooperation activities.

It is costly to deal with day-to-day communication between Tokyo and Bangkok. Prompt decision is often necessary to efficiently implement the program. In this sense, local liaison office is necessary to arrange and distribute satellite lectures and e-learning and other teaching materials. Tokyo Tech Office (Thailand) also serves to promote collaboration in research and development between students of AIT and researchers of Tokyo Tech, and/or researchers between two institutions.

It further promotes networks among Thai graduates of Tokyo Institute of Technology as well as strengthening relationship among local research communities and industries of Thailand and Japan. There are over 150 Thai graduates of Tokyo Tech who actively contribute to development of Thai industries. At the same time, however, there is no systematic network among these graduate. Tokyo Tech Office (Thailand) aims at serving as a focal point for the Tokyo Tech graduates in Thailand and neighbouring countries.

Systematic monitoring and evaluation would be inevitable to develop effective and sustainable collaboration between two institutions. The project plans to monitor the activities from technical, substantive and sustainable aspects. Tokyo Tech Office (Thailand) will serve local focal point of the monitoring mechanism. It is further emphasized that recent trend of science and technology is to actively promote cooperation and joint innovation between educational and research institutions and industries and enterprises. Tokyo Tech Office (Thailand) will serve to promote external relations with business sector and various industries, and other academic institutions to further develop innovative ideas into practice.

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 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) end of the course evaluation.

The purpose of the general survey is to gather background information of the students. This survey is conducted once at the beginning of the course. The weekly survey aims at collecting information on the study habit and life on campus in general. This is to further develop and improve the program based on valuable input and opinion of the students. 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.[33] 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.[34] End of the term course evaluation was conducted in early August to receive feedback of the students on the course content and overall satellite lecture program.

Preliminary Result of the Monitoring

Feedback of the student has been received from technical survey, general survey and weekly survey. Although this is still at the early stage to evaluate the program, the paper intends to share information based on preliminary result of the survey collected. Table 1 shows basic data on student body that provided feedback for the survey.

Table 1
Basic Date on Student Group of Survey

- 7 graduate students in MA program
- Taking a course of "Advanced Signal Processing" and "VLSI Design Methodologies"
- All male students
- Majority in their late 20s
- Students are from Thailand, Bangladesh and China
- Student interest level is high
- Feedback was received every week for 6 weeks.

Source: General Survey, July 2002

Table 2
Summary of Students' Feedback

Technical Aspect
• Quality of overall television screen such as charts, tables, and facial expressions of the lecturers was fair. • Students did not encounter particular difficulty in understanding teaching materials used during the lectures. • Transmission of pictures and sound including time lag, clarity, and volume was generally good and did not bother students' concentration. • Student felt sense of involvement during satellite lectures since lecturers promoted active interaction with students. • Satellite lectures requires additional concentration, and thus students felt tired after the lectures. • Question and answer period requires sufficient time. • Interaction system, particularly use of microphone during question and answer period, needs improvement.
Study Habit Aspect
• Majority of the students use self-study to prepare for each lecture with an average of 90 minutes. • Students spent an average of two hours to review each lecture. • Group study including discussion, and tutoring of TAs was major method of after-class review. • Every student met with TA regularly to conduct follow-up study after satellite lectures. • Receiving lecture notes in advance is highly requested by the students. • Students appreciated direct communication with lecturer in person prior to the satellite lecture program and in the middle of the course.

Source: Technical Survey, June 2002; Weekly Survey, July 2002

Students' feedback on technical aspect is summarized in Table 2. 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, and thus, they feel tired after the lectures. 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.

Lessons Learned

Although it is still a pilot phase of the project, active feedback of the students of the recipient institution provided useful and insightful inputs (See Table 3). 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 asynchronous approachs 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.

Unexpected outcome of this pilot project was the importance of developing the team work. Tokyo Tech's lecturers, local counterpart lecturers and teaching assistants at AIT and group of students all worked in a team. This initial team contributed to improve the project through active exchange of opinion and ideas as project continued for three months. The program is still in the process of development. Commitment for further improvement from both sides would continue to serve better in the field of education and research in Thailand and Japan.

Table 3

Summary of Lessons Learned from the pilot phase

- Q&A period could come at the beginning of the lecture to answer the questions from the previous lecture.
- Students' preparation for the class in advance was critical and thus lecture notes should be provided in advance.
- Web-based materials assisted students review better.
- TA's regular involvement with students was an important factor.
- Communication among students was promoted through active group discussion.
- Sense of involvement encouraged students to concentrate better.
- Initial face-to-face lectures had a positive effect.
- Advanced graduate courses are appropriate for satellite lectures since students' interest level is quite high.
- Prompt feedback of students helps lecturers to organize better.
- Combination of satellite lectures and face-to-face learning is the key to success.

Source: Discussion between Tokyo Tech and AIT, Global Scientific Information and Computing Center, Tokyo Institute of Technology, July 2002.

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Note

28. Four University Alliance Program started in 2001 with active exchange of lectures between Tokyo Institute of Technology and Hitotsubashi University and is currently expanded to Tokyo Medical University and Tokyo University of

Foreign Languages.

29. 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).
30. Proposal paper of Tokyo Institute of Technology submitted to the Ministry of Education and Sciences on April 19, 2002.
31. Currently, there are request on courses such as "Wave Theory", "Bioinformatics" and "Environmental Engineering".
32. "Tokyo Tech Office (Thailand)" is inaugurated on October, 2002. It is located in Science Park near Bangkok.
33. General Survey and Weekly Survey were developed by the project team of Global Scientific Information and Computing Center, Tokyo Institute of Technology.
34. Technical Survey was produced by Center for Research and Development of Educational Technology, Tokyo Institute of Technology.