A Real Time Class Exchange Program over the Pacific

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Abstract

This paper introduces our research/development project of designing a borderless educational environment on the Internet and the practice of real time distance class exchange program between Hosei University and UC Davis. The project, supported by the MEXT (the Japanese Ministry of Education, Culture, Sports, Science, and Technology) aims at designing the effective interactive virtual learning environment for higher education started in 2002 when the multimedia communication via Internet had just begun. The research/development focuses on establishing solid audio/video connection between Japan and the U.S. universities for the real time distance class delivery and developing assisting systems for the learners. The project confirmed, through the practice of several actual class deliveries, that the real time class over Pacific can be carried out with satisfactory audio/video interactivity. The project also developed systems to support learners, e.g. real time subtitle system, simultaneous translation system and multilingual learning management system. Emphasis of the assisting system development is to help non-native English speakers fully understand English lectures.

Keywords

Synchronous, Real time Distance learning, H323, Open Source Learning Management System, Subtitle System, Sakai Project, Credit Base Distance Class Exchange.

1 Introduction

Due to a remarkable progress in the broadband Internet communication environment, audio/video links among major cities over the Internet are now quite stable in spite of their best effort principle. When we began the real time cross Pacific distance class delivery over the Internet in the year 2002, in general, the Internet was believed not to be stable enough to run the real time distance classes. At that time, the pioneering TIDE (Trans-Pacific Interactive Distance Education) project between Kyoto University and UCLA was utilizing dedicated broadband ATM link\cite{1}. Expensive satellite or ISDN links were alternative choices for the stable multimedia communication. We started the real time Internet class delivery with the pre-MBA program collaborating with CSUEB (California State University, East Bay) in 2002\cite{2}\cite{3} The plans was a real challenge at that time. We prepared IDSN digital line for emergency backup which is now no longer necessary to keep. This paper briefly introduces systems we have developed for the IP based real time class delivery over the Pacific. Development includes that of systems to support non English speakers fully understand English lectures, e.g. automatic subtitle system or simultaneous translation systems over the network. Assisting technology is useful for Japanese students to understand English lectures. We run several real time distance classes on the developed system. The feedback from the real educational practice is valuable for improving the system. Started with pre-MBA program with CSUEB, we run several educational programs. Amongst of all, the real time class exchange program with UC Davis has unique bi-directional educational scheme which is beneficial for both institutions and students. In the scheme, both institutions can enrich their educational programs complementing their strength. Students, at both ends, can interact with each other to learn the same subject providing them a rare opportunity for the cross cultural understanding.

2 Systems for Borderless Distance Education

2.1 IP based Video/Audio link

To realize a borderless educational environment, we have developed a real-time distance lecture system which links our three campuses (Ichigaya, Tama,
Koganei) and HURIC (Hosei University Research Institute, California) located in the vicinity of San Francisco, CA, U.S.A. HURIC was established in 2001 as an authorized U.S. NPO to serve Hosei university’s overseas programs. Since 2002 it has been active as an oversea cooperative research facility for the open research study project supported by the MEXT. The links among HURIC, Hosei University IT Research Center, Tama campus and Koganei campus have been set. The MUC (Multiple Connection Unit) makes simultaneous connection of multiple sites possible. The basic link consists of Video/ Audio connection by a standard H.323 system and a system to synchronize PowerPoint slides. In order to maintain the stable connection, the connection speed has been restricted to 512-768 Kbps, but the survey taken from the class participants shows satisfactory results in both video and audio quality. For smooth interaction between both ends, a special audio visual system to zoom the camera to the speaker is equipped at a distance classroom.

2.2 Assisting system development

2.2.1 Open source Learning Management System

In addition to the above core system, we have developed and installed a web-based educational supporting system. Originally we used a commercial system named Dot Campus (Interlect Co. Ltd.) for the class support but since the fiscal year 2005, we have introduced the open-source Sakai collaboration management system (http://www.sakaiproject.org), which became popular recently and has been adopted by many major U.S. Universities. Hosei University has participated in the Sakai project as a developer contributing the internationalization of the system. The web-based education support system servers are placed in the university’s main campus and data center of the Internet provider, IIJ Inc., located in San Jose which is near HURIC, and used to support real-time lectures e.g. electronic report handling, presenting teaching materials, discussion forum. Besides the web-based educational support system, a traditional mailing list was prepared to promote communication between instructors and students. Another direction of the system development we have conducted is to develop support systems for students whose native language is not English.

2.2.2 Content Archiving System

We have developed an automatic digital content archiving system with audio keyword search function[4]. The system archives video/audio contents in WMV format together with PowerPoint slides and hand-written text in real time. For review purpose, students can get CD-ROM after the class. These archived contents are very useful for Japanese students to understand English lectures. For the efficient review of long lasting lectures, we have added the voice keyword search capability to the system. The system utilizes the API developed by Fast Communication. Students can search audio file by their keyword input. When the keyword is input by the text, a learner will get a list of links on the screen to the WMV file position where the keyword is spoken. The number of relevant links can be specified. The learner can replay the audio/video record from the specified time, e.g. 3 seconds, before the keyword was spoken.

2.2.3 Subtitle and Translation System

As another system to help non-native English speakers understand English lectures, we have developed a system which automatically displays English captions of lectures and stores them in text files[5]. In the system a person called re-talker plays an important role. The re-talker repeats what the lecture says in such a manner to be acceptable for the software to convert voice to text, i.e. speaks monotonically with constant speed. By the aid of re-talker the system achieves high accuracy 97.6% in the conversion. The converted text will be sent to the server. Students can see the text superimposed on the display just like movie or TV captions. The text will be edited after the class rectifying some remaining errors and be up-loaded to the server. Students can download the text file. In the real-time captioning, the text is delayed a few seconds because the audio have to be converted after the re-talking. We observed that students lose their concentration in listening to the lecture because they tend to focus their attention on following the text captions. It became clear that the text reviewing after the lecture is more beneficial than following the real-time captions. In addition to the automatic captioning system, the simultaneous interpretation system is introduced for the distance class on Welfare Engineering. The class is for undergraduate engineering students whose English proficiency is not quite sufficient. Simultaneous translation booth has been set at the classroom and students can listen to the translated Japanese. The system is now under development to enable to setup the translation booth at a remote site. The system may also be useful for the distance seminars targeting general public.

3 International Distance Classes

Based on the system described above, we run several international distance educational programs. We have started the real-time distance classes with Pre-MBA program collaborating with California State University, East Bay. The program facilitates students
to earn the MBA degree in one year by taking several core classes in distance. Another class entitled Welfare Engineering is provided to undergraduate engineering students by connecting three domestic campuses and two oversea remote lecturer’s sites in HURIC and KAIST (Korean Advanced Institute for Science and Technology). In this program, Professors Zenn Bien with KAIST, Machiel van der Loose with Stanford University and Hisato Kobayashi with Hosei University give the lecture from different distance sites. These classes pioneered the international credit base class delivery over the Pacific. However, the class is one directional. We initiated bi-directional class exchange with UC Davis where both institution.

3.1 Hosei-UC Davis Distance Class Exchange Program

From the 2nd term of 2004, we have started e-Class Exchange Program with UC Davis, in which both parties deliver distance lectures alternatively. The objective of this program was to give students from different cultures the opportunity to share real-time lectures beyond geographic restrictions and to increase learning effectiveness through their interactive discussions. Distance Lecture Room 1 in the Hosei University’s Kudan campus and Olson Hall located in the UC Davis campus are connected for this program. Using H323 video conference system equipped in the UC Davis Distance Lecture Room, the audio/video connection link has been established. Hosei University has two WAN connection nodes to the Internet, i.e. SINET (Scientific Information Network) and IIJ (Internet Initiative Japan). Connectivity test showed the remarkable differences in the packet round trip time (RTT) indicating that the careful route selection is important to establish a stable international link via the Internet. Lectures were offered as credited subjects for Hosei University’s ESOP program (Exchange Students from Overseas Program), which is open for foreign students and Japanese students whose TOEFL score is above CBT207/PBT540, and also as a credited subject of UC Davis’s Humanities Program. Ten 2-hour lectures offer 2 credit units for students. UC Davis sometimes offers 4 credit units adding extra field studies to the UC Davis students. Up to this spring, 56 Hosei University students and 50 UC Davis students have taken the lectures. The Table below shows the subjects offered. UC Davis delivered lectures in fall 2004 and spring 2006 and Hosei University did the remaining periods.

The lesson evaluation results revealed that audio/video quality and interactivity is satisfactory even though the lectures are delivered through the Internet. Most of the students claimed that this e-class exchange program should be continued. The classes exchanged are as follows:

Fall 2004
Violence and Culture in the United States and Japan Jay Mechling, Professor of American Studies University of California, Davis

Spring 2005
Japanese Thought I: A Verification of Modern Japan – Was the Way to the Total War Inevitable? - Toshikazu Takao, Professor Emeritus, Hosei University

Fall 2005
Japanese Thought II - Christianity in Japan during the Asian-Pacific War and the following Post-war Period Toshikazu Takao, Professor Emeritus, Hosei University

Spring 2006
Youth Cultures in the United States and Japan Jay Mechling, Professor of American Studies University of California, Davis

Fall 2006
Introduction to Japanese Visual Pop-Culture: from Godzilla to Ghost in the Shell Reiko Tochigi, Professor Intercultural Communication, Hosei University

Spring 2007
Exploring Intersections of Japanese, American, and Latin American Culture- Cultural awareness: comparing different treatments of similar topics in Japan, the US and Latin America-Pablo Ortiz, Professor of Humanity, U.C. Davis

4 Future Perspective

Based on our experience in the Hosei University-UC Davis e-class exchange program, we are convinced that the e-class exchange is a promising practice that enriches the educational curricula of participating universities, as well as the quality of students’ learning experiences. Based on the success of the e-class exchange program, we are trying to expand the program to wider range of the educational fields. Cross-cultural issues and regional studies are suited to the international e-class exchange program. A possible program is the class exchange between Noh research institute at Hosei University and the Department of Theatre and Dance at UC Davis. Language programs are also well-suited for e-class exchanges. For both languages and theater courses, the audio/video quality should be much higher than current H323 system. The
latest commercial implementation of H264 (Mpeg-4) standard to the IP based video communication systems may be a solution to exchange programs that require high audio/video quality. It is now possible to run synchronized e-class exchanges worldwide. By an appropriate time window selection, e-class exchange is possible between any major Cities in the world. From Tokyo, e-classes could start with U.S. in the morning, afternoon classes with Asian countries and end with evening classes with European countries. From UC Davis, classes will start from European countries and end with Asian countries. Direct inter-cultural dialogue and overseas study and work opportunities will enrich the global competency and diversity at each partner institution, a vital ingredient for effective exchange programs and global citizenship. In addition, students will gain a greater understanding of their major within a global context, as well as the differences and similarities in social and cultural norms between the U.S., Japan, and other Pacific Rim universities. Participants will also gain a better understanding across the Pacific Rim through the multi-national perspectives. Students participating in internship programs will establish solid contacts and practical experience that will make them more competitive in their future professions. We would suggest the APRU will take a lead to form International world wide e-class exchange program to strengthen the educational programs of participating Universities. Pacific Rim E-Learning Advisory Board could be set to create distance learning curriculum under the common syllabi and core readings across all participating universities. In addition, new study and internship abroad courses and exchange programs across Pacific Rim universities will be in place.

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References