Investigating the Effectiveness of BU WebEx System

Payon Krainuyachan[1], Worawat Choensawat[1*], and Don Isarakorn[2]

[1]School of Science and Technology, Bangkok University, Bangkok, Thailand

[2]Department of Instrumentation and Control Engineering, King Mongkut's Institute of Technology Ladkrabang, Bangkok, Thailand

ABSTRACT

Nowadays, distant-learning systems provide a wide range of learning techniques with flexibility that provide students with increased opportunities, convenience, and personalization. In the 21st century, students can choose their own studying style whether learning at home or the university. Students can learn at home without the physical presence of a teacher. Recently, Thailand has experienced the worst flooding in over 50 years. At that time, some students and teachers had difficulty in commuting. For that reason, Bangkok University adopted a "BU WebEx" system which designed for helping teachers and students for distant learning. So far, there is little research have been conducted on the effectiveness of distant learning. In this study, we analyzed and described how students and teachers participated in the BU WebEx system. We examined the students' participation rates, the network connection, and the amount of spending time. The data consist of log files of the BU WebEx system and user's feedbacks after using the system.

Keywords: WebEx System, Distance Learning, Virtual Classroom, Effectiveness Evaluation.

1. INTRODUCTION

Recently, online learning and distant learning are growing rapidly which provide learners the opportunities on both time and space [1]. The Statistics from National Center for Educational indicates that the enrollment of distance-education services in higher-education institutions in US are doubling every three years. Moreover, more than half higher-education institutions offer distance-education services [2]. A distant-learning system affords the student many unique benefits like flexibility, convenience and accessibility.

* Corresponding author: Email: worawat.c@bu.ac.th

From July to December of 2011, Thailand has experienced the worst flooding in over 50 years. Because of the flooding, one of the two Bangkok University's campus was shut down. At that time, some students and teachers had difficulty in commuting. Fig. 1 illustrates the flooding in Bangkok University Rangsit campus. Since then, Bangkok University adopted "BU WebEx" (Bangkok University WebEX) system which designed for helping teachers and students for distant learning. The BU WebEx is the distant/virtual classroom system which adapted from WebEx Training Center developed by Cisco [3]. This system allows audio and visual interactions between teacher and students. In addition, the system also provides the functionality for annotation on the teaching material and the ability to communicate using chat facility amongst participants. The question is "Can BU WebEx system alone matches the conventional on-campus education?"

Figure 1. Flooding in Bangkok University Rangsit campus

Several researchers have investigated the effectiveness of distant learning systems [4], [5]. In this study, we analyzed and described how students and teachers participated in BU WebEx system. We examined the students' participation rates, network of interaction, and the amount of spending time. The data consisted of BU WebEx log files and user's comments/suggestions after using the system.

2. REVIEW OF VIRTUAL CLASSROOMS

Essentially, the most useful tools for supporting e-learning systems are facilitated by media such as e-mail and discussion boards [6]-[8]. The advantage of these tools is to support work relations among students, and with teachers, even when they are not online at the same time. In such case of the online course, people take them because of the advantage in the asynchronous nature. Such the advantage allows learners to combine education with work and other commitments. Most people use the asynchronous system for downloading documents, posting some questions or sending messages to teachers or among students whenever they log on to the system at any time.

Learning in isolation, especially in a computer based environment is seldom interesting. Most of online learning systems are primarily asynchronous where the users lack real-time interactions and representations of their identity. Therefore, a virtual classroom should establish a strong virtual presence [9], [10]. We categorized the types of virtual classroom that provide the virtual presence and a collaborative environment into two main categories as follows:

- Live video/audio streaming on the Internet
- 3D virtual environments using avatars

The first type of virtual presence promotes using video where participants are able to see each other and feel they are connected. Examples include Skype, Access Grid, GoToMeeting, and WebEx. Fig. 2 shows students participant in a virtual class using live video/audio through the internet. Some main beneficial of this virtual presence are as follows:

- Online and real time learning in the present of instructor
- Reduce travel time and cost
- Reduces learning time as compared to e-learning
- Provide facility to record teaching sessions for future use

Figure 2. Students participating in a virtual class

The second type of virtual presence enables participators to explore and interact to each other's in the virtual 3D [11]. In this system, a 3D character model known as avatar represents the user, giving a sense of presence in cyberspace. Currently, most research in this area focuses on virtual worlds like Second Life (SL) [12] as shown in Fig. 3. Reuters reports that, in SL, over 50,000 users were online simultaneously and a monthly growth rate of more than 20% since September 2008 [13]. SL is a virtual 3D world bursting with opportunities in areas like collaborative learning, legal practice, corporate connections, and people [14]-[19].
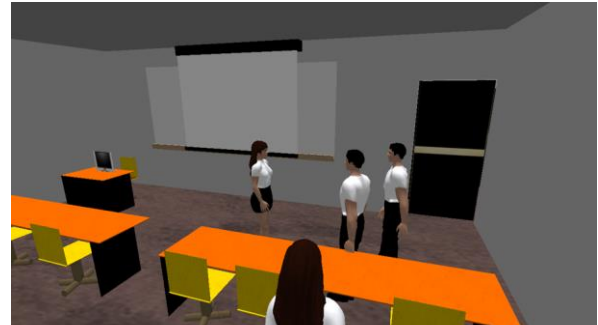

Figure 3. An avatar-based virtual meeting in second life

3. SYSTEM OVERVIEW

Information and Communications Technology (ICT) plays important role as an alternative for delivering learning programs such as through virtual classroom application. A virtual classroom is a teaching/learning tool which provides the classroom-like environment in the Internet as shown in Fig. 4. These features that can be provided by BU WebEx can make the classroom like environment.

Figure 4. Classroom-like environment using BU WebEx

The BU WebEx adopted the features of a Cisco WebEx meeting system to have a solution after the Rangsit campus of BU was temporarily closed. The main feature of the Cisco WebEx system is a TelePresence that can provide a video-based online teaching environment. The pervasive video conference can extend university's high-touch technology as implemented for California Baptist University (CBU) in 2011 [20]. The CBU deployed the Cisco WebEx technology to create richer student-teacher interactions with face-to-face video as well as

facilitate more efficient, flexible voice communications. As a result, the Cisco WebEx can provide the collaboration architecture that supports university's progressive environment and this will reduce extra offer required by faculty to teach online. Eventually, this will enhance university wide collaboration and interaction through pervasive video.

The BU WebEx is known as a virtual classroom application with the collaborative environment, which runs on a cloud service (WebEx Collaboration Cloud) that links high-bandwidth dedicated lines. The WebEx Collaboration Cloud carries both the voice communications and the rich media commonly used in online virtual classroom. BU WebEx system helps teachers delivering the lesson to their students without having to physically attend to the school, for example using a recorded multimedia, live video streaming, and application sharing over the Internet.
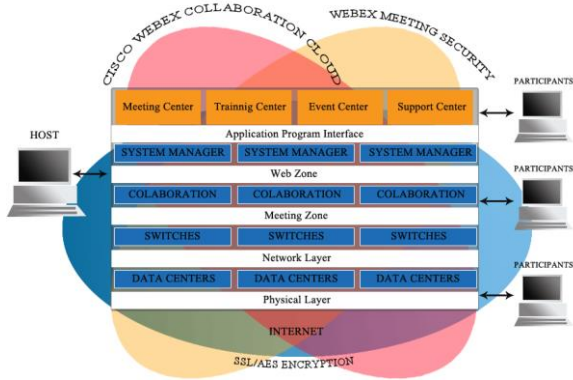

Figure 5. System architecture

Fig. 5 shows the system architecture of the BU WebEx system. For overall of the system, the WebEx has a general purpose of long-distant meeting. The architecture indicates a full service of distant meeting and video conference under the security environment that users will have a high assurance of security and backup of information.

4. SYSTEM EVALUATION

A. *Data Set*

The data set consists of log files during May - June in 2012. Within the period, 445 students and 10 teachers participated in 18 sessions of the BU WebEx virtual classes. Table I and Fig. 6 shows the summary of our data set, and the following facts are reported:

- Varying size of classes are observed, and the smaller and largest classes are 29 and 75 students, respectively.
- The highest and lowest percentage of attendees the virtual classroom is 89.65% and 22.67%, respectively.

- Average of student participation via the BU WebEx is about 60.97%.

Moreover, feedbacks from both students and teachers, total of 65 users, were also collected. Fig. 7 shows the feedback system where users and submit any comments about their satisfaction and problem occurred during the class session.

B. *Evaluation*

We analyzed the amount of students spending time (students online time), during the class session as shown in Fig. 8. As the result, the average amount of students spending time for the session time under 90 minutes, 91 to 150 minutes, and over 150 minutes are 77.2%, 55.2%, and 31.4%, respectively. The descriptive statistics in average, minimum, and maximum number of participants are compared with the size of classes (total number of students registered for the class). It basically corresponds with the course assessment and grading protocol. Approximately 10% of the total score is the participating assessment. However, the virtual classroom is quite different from the traditional classroom as shown in Fig. 9. It shows that some students were on and off line along the class. The situation is difficultly found in the tradition classroom.

TABLE I.   PERCENTAGE OF CLASS ATTENDEES VIA BU WEBEX OF 18 SESSIONS

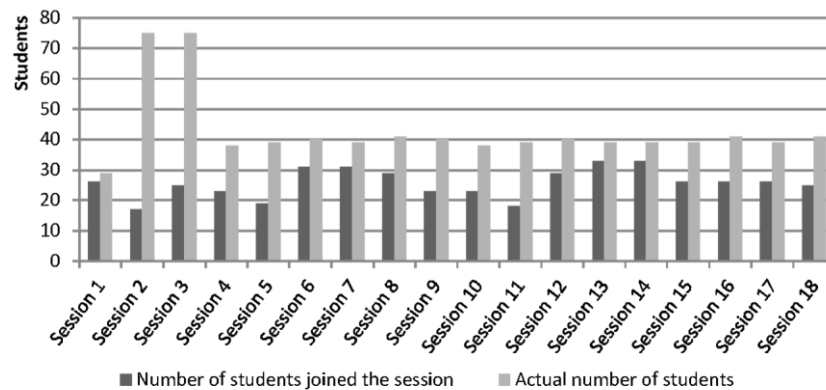| Section	# of Participants	Total # of students	% of Attendees
1	26	29	**89.65**
2	17	75	**22.67**
3	25	75	33.34
4	23	38	60.52
5	19	39	48.71
6	31	40	77.50
7	31	39	79.48
8	29	41	70.73
9	23	40	57.50
10	23	38	60.52
11	18	39	46.15
12	19	40	72.50
13	33	39	84.61
14	33	39	84.61
15	26	39	66.67
16	26	41	63.41
17	26	39	66.67
18	25	41	60.97
Average			**63.68**

Figure 6. Comparison between number of students attended the session and number of students registering the class
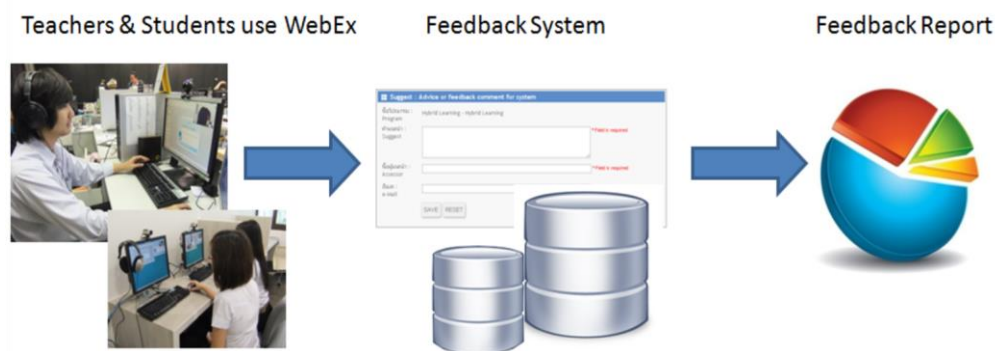

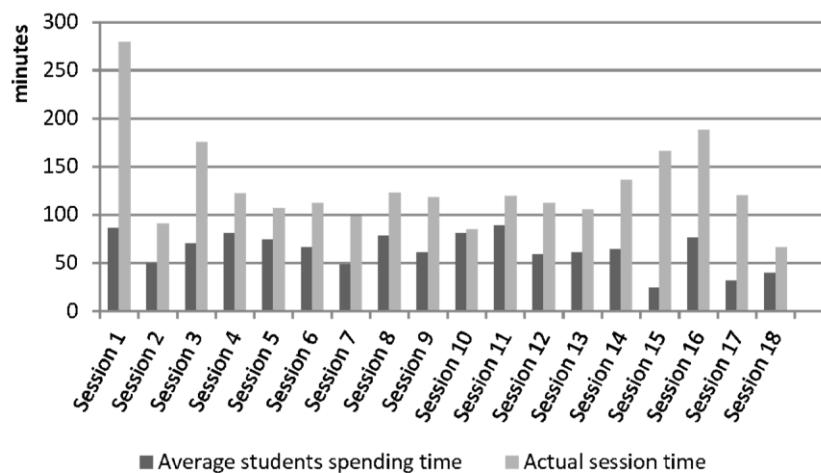**Figure 7.** The feedback system will be run after a virtual classroom every time.

Figure 8. Comparison between average students spending time in the session and actual session time

5. CONCLUSIONS AND DISCUSSIONS

In this study, the effectiveness of BU WebEx system is investigated. The result shows that the smaller class, the highest percentage (89.65%) of attendees the virtual classroom via the BU WebEx is controllable. Even though the percentage of attendees seems to be high, however, by observing the log of each individual student's spending time in the session (see Fig. 9), many students were late to join the session and also many students left the session early. These situations are unlikely to encounter in a traditional classroom where students have awareness of coming late for class. In the traditional classroom, when students come to class late, it can disrupt the

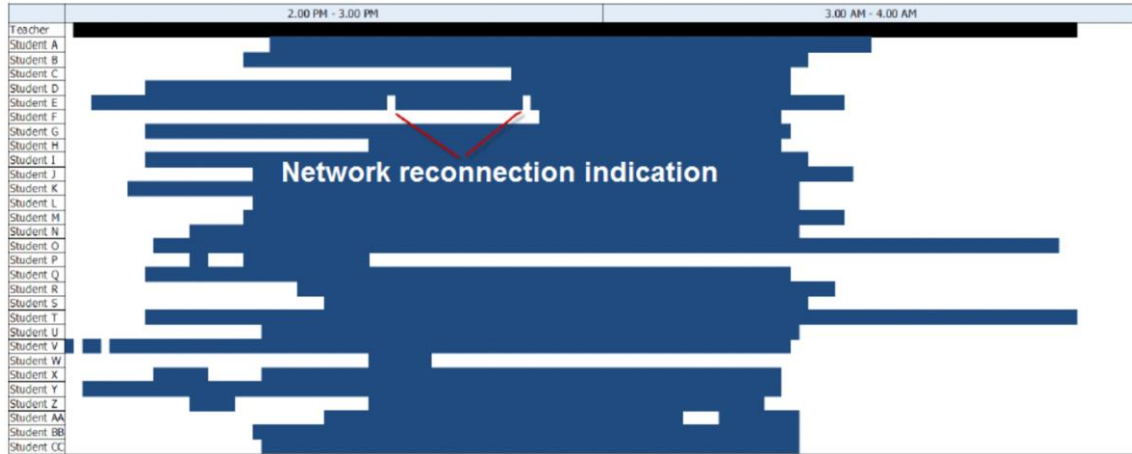flow of a lecture or discussion and distract other students.

Figure 9. Sample of students' spending time in the session

The suitable period of session time is under 90 minutes where the average student's online time is 77.2% of the session time. The result shows that by increasing the session time the average students online time will decrease, and it will decrease dramatically if the session is over 150 minutes.

The system allows users to write any comments that will tell us the user satisfaction and the problem occurred during the virtual class. We collected the feedback from 65 users, and their comments are classified in positive, suggestion, and negative as shown in Table II.

TABLE II.   THE USER COMMENTS AND THEIR TROUBLE ISSUES.

Type	Detail	# of class	Total
Positive	-	-	12
Suggestion	-	-	4
Negative			49
	Technical Issue	46	
	Others	3	

For the technical issue, the major categories of problems and their percentage are listed below:

- Network connection 12.75%
- Difficulty of the system functions 6.25%
- Sound and video 62.25%
- Device and equipment 18.75%

This concludes that the main problem of usage is about the minimum requirement of hardware in the client side. The technical issue is obviously detected, and its solution is straightforward. The interesting issue is about three cases of others. Their comments implied about their preference on the traditional class as well as unfamiliar to the online meeting.

6. FUTURE WORK

For the future work, the teaching method will be examined to increase the percentage of attendees and the percentage of student's online time of the virtual classroom. There are many factors that may influence the percentage of attendees and the percentage of student's online time of the virtual classroom such as:

- Students do not see the important of the course or its content.
- Students do not perceive the virtual classroom environment as supportive.
- Students' background knowledge and skills vary widely.
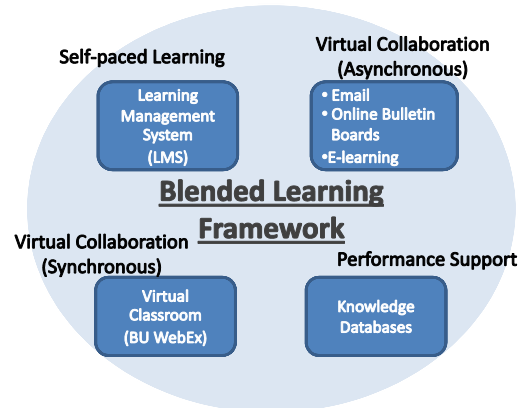- Students cannot seek help when needed.

Figure 10. Blending learning method integrated with four sub-systems: Self-paced learning, Synchronous virtual collaboration, Asynchronous virtual collaboration, and Performance support.

Therefore, firstly, a new teaching method will be proposed to stimulate the recognition of the objective value of a topic. If students recognize its value and clearly see how coursework connects to their goals,

interests, and concerns, they will be more likely to value it, and thus more motivated to expend time and effort. Secondly, a blended learning approach can be a solution that can improve the effectiveness of the distant-learning. The blended learning approach combines face to face classroom methods with computer-mediated activities to form an integrated instructional approach [21], [22] which defines as an integrating system of synchronous and asynchronous virtual collaboration including the self-paced learning and performance and assessment tool as shown in Fig. 10.

REFERENCES

[1] Williams, M.L., Paprock, K., Covington, B. Distance learning: The essential guide. Sage Publications, Incorporated, 1998.

[2] National Center for Education Statistics. Post-secondary education quick information system survey on distance education at higher education institutions: 2000-2001, 2002.

[3] Cisco Systems. Webex training center. http://www.webex.com.

[4] Naruetep, S. Satisfaction survey in computer and information technology course, via "bu webex" system and e-learning web site. Proceedings 5th National Conference on Technical Education, 2012.

[5] Mohammad, S., Job, M.A. Evaluation of infrastructure for e-learning system in aou-bahrain branch. International Journal of Information, 2(4), 2012, 381-389.

[6] Wang, Y.S. Assessment of learner satisfaction with asynchronous electronic learning systems. Information & Management, 41(1), 2003, 75–86.

[7] Hrastinski, S. Asynchronous and synchronous e-learning. Educause quarterly, 31(4), 2008, :51–55.

[8] Ong, C.S., Lai, J.Y., Wang, Y.S. Factors affecting engineers' acceptance of asynchronous e-learning systems in high-tech companies. Information & management, 41(6), 2004, 795–804.

[9] Klesath, M., Annetta, L.A., Folta, E. The role of synchronous interactions within higher education distance education courses, Springer Netherlands, 2010, 71-82.

[10] Annetta, L.A. Folta, E., Klesath, M. V-learning: Distance education in the 21st century through 3D virtual learning environments. Springer, 2010.

[11] Kauff, P., Schreer, O. An immersive 3d video-conferencing system using shared virtual team user environments. In Proceedings of the 4th international conference on Collaborative virtual environments, ACM, 2002, 105–112.

[12] Boulos, M.N.K., Hetherington, L., Wheeler, S. Second life: an overview of the potential of 3-d virtual worlds in medical and health education. Health Information & Libraries Journal, 24(4), 2007, 233–245.

[13] E. Reuters. Second life tops 50,000 concurrency, 2008.

[14] Edwards, C. Another world. Engineering & Technology, 1(9), 2006, 28–32.

[15] R. Freedman. How to make real money in second life. New York, 2008.

[16] Kumar, S., Chhugani, J., Kim, C., Kim, D., Nguyen, A., Dubey, P., Bienia, C., Kim, Y. Second life and the new generation of virtual worlds. Computer, 41(9), 2008, 46–53.

[17] Macedonia, M. Generation 3D: Living in virtual worlds. Computer, 40(10), 2007, 99–101.

[18] Reisinger, J., Kappel, J., Cresp, J. Mashing the real world with virtual worlds a monetizing opportunity. In Innovations in NGN: Future Network and Services, 2008. K-INGN 2008. First ITU-T Kaleidoscope Academic Conference, IEEE, 2008, 111–116.

[19] Sookhanaphibarn, K., Thawonmas, R. A framework for design and evaluation of digital museums in second life as learning institutions. In Intelligent Information Hiding and Multimedia Signal Processing, IIH-MSP'09. Fifth International Conference on. IEEE, 2009, 1130–1133.

[20] Cisco publish information. Pervasive video extends university's high-touch culture, 2011.

[21] Garrison, D.R., Vaughan, N.D. Blended learning in higher edu-cation. Framework, principles, and guidelines. San Francisco, John Wiley&Sons, 2008.

[22] Osguthorpe, R.T., Graham, C.R. Blended learning environments: Definitions and directions. Quarterly Review of Distance Education, 4(3), 2003, 227–33.

Payon Krainuyachan received his Bachelor of Business Administration degree in Information Systems from Rajamangala University of Technology Krungthep in 2006. He is currently studying Master of Science in Information Technology and Management, Bangkok University. While his studying, he also works as a System Administrator at Computer Center, Bangkok University. His main research interests are network systems, virtual machine, and virtual classroom system.

Worawat Choensawat received his Dr. Eng degree from Science and Engineering, Ritsumeikan University in 2012. During his stay in Ritsumeikan University, he was a research assistant in the Global COE program of Digital Humanities Center for Japanese Arts and Cultures. Currently he works at the School of Science and Technology, Bangkok University, Thailand.

Don Isarakorn obtained his Ph.D. degree in the field of Piezoelectric MEMS at the Sensors, Actuators and Microsystems Laboratory (SAMLAB), Ecole Polytechnique Federale de Lausanne , Switzerland in 2011. He was awarded "Prix de La Ville de La-Chaux-de Fonds" and "Good Ph.D Thesis Award from the Office of National Research Council of Thailand " in 2011. His main research interests include piezoelectric materials for sensing and actuating applications, MEMS process development, energy harvesting systems, robotics, mechatronics, Automatic control systems, and biomedical instruments.