ATHABASCA UNIVERSITY

SYNCHRONOUS WEB CONFERENCING:
TOWARDS A PEDAGOGICAL MODEL FOR EFFECTIVE LEARNING

BY

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Approval Page

The future of learning.

Approval of Thesis

The undersigned certify that they have read the thesis entitled

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It has never occurred to me that I would take up formal study at the doctoral level. The thought of committing myself to the discipline and rigor of research study seemed, at the time, beyond my grasp. Certainly, in a traditional face-to-face program, the "travel to class" time would have been higher, making the whole endeavor inefficient and less appealing. When Athabasca University (AU) and SIM University (UniSIM) signed a Memorandum of Understanding on academic exchanges at the faculty level, I was encouraged by my former Dean to consider studying in AU's EdD in Distance Education program. At the beginning, three senior UniSIM Professors gave me the confidence to pursue this learning journey: Professor Tsui Kai Chong (Provost), Professor Koh Hian Chye (Assistant Provost, UniSIM College), and Associate Professor Neelam Aggarwal (Dean, School of Arts and Social Sciences – retired), and I am sincerely grateful to them for their guidance and support. In addition, I would also like to acknowledge the funding support (S$10,000) provided by UniSIM's Center for Applied Research, which enabled me to implement the technological solution for this study.

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Abstract

Pedagogy supported by synchronous web conferencing is the topic of this research study. While pedagogy for asynchronous online learning has been widely studied, there is little literature on a coherent pedagogical model that guides teaching and learning practices in a synchronous web-conferencing environment. The study undertaken here aimed to address this gap by investigating the extent to which synchronous web conferencing offered a benefit over traditional classroom-based learning. The action research methodology based on the mixed methods of combining quantitative and qualitative analyses was adopted to investigate (a) the students' course achievement over three semesters, (b) the factors contributed to students' positive learning experience, (c) the emergence of a set of pedagogical patterns; (c) the implementation issues of synchronous web conferencing; (d) the potential of learning analytics; and (e) the development of a pedagogical model. At an overall level, when the data from the three semesters was combined, the study revealed that students' achievement in terms of their examination results was significant ($p = 0.04 < 0.05$) between students who experienced synchronous web-conference learning (Mean = 68.9, SD = 11.8) and those who experienced face-to-face learning (mean = 65.5, SD = 12.2). However, at the individual semester level, there was no significant difference in two of the three semesters studied.

Keywords: synchronous web conferencing, pedagogy, action research, learning analytics

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Chapter I - INTRODUCTION

Synchronous web conferencing is a system of teaching and learning that takes place in real-time, supported by online technology, between the instructor and students who may or may not be in the same location. This study investigated student achievement and pedagogical issues associated with synchronous web conferencing (web conferencing from here on) in the teaching and learning context of SIM University (UniSIM). The idea and motivation behind this topic stem from Athabasca University's (AU) cohort-based model of delivering distance education to graduate-students worldwide. In particular, the synchronous element involved the instructor and learners participating in teaching and learning activities in real-time via a web-conference system. Specifically, this research study investigated the following areas: (a) web-conference implementation in UniSIM; (b) the technological and pedagogical challenges posed by this kind of online educational practices; and (c) a suitable pedagogical model for teaching and learning in web conferencing.

History and Background of the Institution

Established in 2005 by the Singapore Ministry of Education, UniSIM is Singapore's private university for working adults with a vision of "serving society through excellence in flexible learning" and a mission "to provide opportunities for professionals and adult learners to upgrade their qualifications, knowledge and skills through a wide range of relevant programs" (SIM University, 2011, p. 1). Before 2005, UniSIM was known as the Open University Centre (OUC) of the Singapore Institute of Management (SIM), which offered courses to adult learners provided by the Open University of the United Kingdom since 1992. Today, there are two modes of learning at UniSIM: (a) classroom-based seminars with e-learning support for undergraduate-

degree courses, and (b) 100% classroom-based lectures for diploma courses. For students taking undergraduate-degree courses, their attendance in class, normally held in the evenings and during weekends, was not compulsory. All undergraduate students were provided with a comprehensive set of course materials comprising textbook(s), printed study guides, and assignments. For diploma students, they attended a traditional, face-to-face, lecture-based program with course notes provided by the instructors. Lectures were held during the day and attendance was compulsory for diploma students.

For both degree and diploma students, their learning progression in each course was assessed through a combination of in-course assignments (individual and group-based) and end-of-semester examinations or individual projects. In-course assignments were marked by the instructors who were required to provide detailed feedback as part of the learning support for students. Examinations and projects were also marked by instructors.

Before 2006, UniSIM's e-learning support for students and instructors was through a learning management system (LMS) known as the Computerized Learning and Assessment System (CLASS), which provided common asynchronous learning functions such as online assignment submission and discussion forums. In 2006, UniSIM replaced CLASS with Blackboard (LMS). At the same time, UniSIM also embarked on a program of course development with e-learning elements such as video and multimedia contents for its undergraduate courses. The Blackboard LMS was introduced for the Diploma in Management Studies (DMS) program in January 2011 with online learning contents, quizzes, assignments, discussion forums, and grade information available for asynchronous access by students and instructors.

Given the asynchronous nature of UniSIM's e-learning environment, there existed an opportunity for pedagogical research in web conferencing. The DMS Information Systems for Business course (BUS017) was selected for this study because, in addition to investigating pedagogy, the introduction of web conferencing also helped to solve a particular situational problem as described below.

Institutional Objectives and Importance of Study

The study of web conferencing fulfilled an e-learning gap that existed in UniSIM's diploma courses because, before this study, there were no e-learning activities conducted synchronously. Exposing students to web conferencing was necessary because this is an important element of the 21st century-learning skills that include communication, collaboration, creativity and innovation, global awareness, critical thinking, problem solving, and information communication technology. Students are expected to be conversant in these skills in today's digital world (The Partnership for 21st Century Skills, 2013).

From a theoretical perspective, the study also aimed to make a contribution towards a body of research on pedagogy for web conferencing, a topic that had limited coverage in the literature (de Freitas & Newmann, 2009).

The overriding objective of this study, therefore, was to provide a systematic roadmap for investigating the research problem within the teaching and learning context of the DMS program at UniSIM and to find answers to the research questions from both theoretical and practical perspectives.

Overview of Diploma in Management Studies

The Diploma in Management Studies program has a long history in SIM. Spanning over three decades, it was first offered by SIM in 1973 for working adults. When UniSIM was established in 2005, the School of Business re-designed the DMS program and introduced new courses such as business law, financial accounting, and information systems. The new DMS curriculum (see Appendix B) is taught by the school's full-time and associate faculty.

Today, student admission into the DMS program has changed significantly from its early years. It now caters to the learning needs of both local and foreign students. See Appendix C for the program admission requirements. The foreign students come mainly from Singapore's neighboring Association of South East Asian Nations (ASEAN) such as Indonesia, Malaysia, Myanmar, Thailand, and Vietnam. Beyond ASEAN, there are also students from China, Hong Kong, Mongolia, and South Korea. The age of DMS students is generally between late teens and early twenties, but there are also some mature students in their late twenties.

The DMS Information Systems for Business (BUS017) Course

The Information Systems for Business (BUS017) course provided students with a foundation in information systems from a management perspective. Topics in computer hardware and software are covered, while students also learned other more advanced topics such as data communication, networking, The Internet and the World Wide Web, computer ethics and security, database systems, and system design methodologies. In addition, the practical component of this course offered students hands-on learning in web-site design and database development. The BUS017 course syllabus is discussed further in Chapter 3.

Consistent with other DMS courses taught at UniSIM, classes for the BUS017 course were held in the day time over a seven-week period in each quarterly semester starting in

January, April, July, and October, respectively. Each BUS017 class had 14 lessons that were scheduled twice a week. Each lesson was of 3 hours in duration, which can be either a lecture or a lab session. The 14 lessons were made up of 10 lectures and four lab-sessions. Lab sessions were necessary because of the practical learning required in this course. Typically, 60 to 80 students were registered in each class.

Currently, because each computer lab at UniSIM was limited to 50 students, the Administration Department had allocated one lecture theatre and two labs for each lab-session per class. Each lab-session was divided into three segments: (a) all students attended the first hour in the lecture theatre together with the instructor; (b) in the second hour, half the class went to one lab and the other half went to the second lab; (c) the instructor then followed half the class to one lab; and (d) by the third hour the instructor would go to the second lab to repeat the lesson for the remaining students.

Statement of the Problem

The lab sessions, therefore, had the following problems:

- The instructor had to repeat the same lesson twice.
- The instructor was not available to answer student questions when he/she was in the “other” lab.
- The labs were scheduled on different floors of the campus building, resulting in the instructor having to move a considerable distance between labs (in one semester, one lab was scheduled in the fifth floor while the other lab in the second floor).

Proposed Solution

The *Blackboard Collaborate*™ web-conferencing system was proposed for solving the above-mentioned problem. A software license for *Blackboard Collaborate*™ was purchased for UniSIM for synchronous delivery of the lab sessions. All students could learn and ask questions at the same time despite being physically located in two different locations. Lab activities such as website design and database development could be demonstrated for all students simultaneously. An additional benefit of using *Blackboard Collaborate*™ was that lab or lecture sessions could be recorded for students' after-class viewing. Students could also be divided into smaller groups for better learning interaction with peers and the instructor. Oral communication and presentation skills could also be practiced.

The Study

The study undertaken involved a class of students enrolled in the DMS Information Systems for Business course. The class was divided into two groups: (1) face-to-face learning, and (2) web-conference learning. At the beginning of the semester, the students chose which group to join on a voluntary basis. A research assistant was present in class to assist students' enrollment into their chosen group. For students who opted to join the "face-to-face" group, they attended all 14 lessons in either the lecture theatre or the lab together with the instructor. For students in the "web conference" group, they attended eight lessons in the lab "away" from the instructor and the "face-to-face" students. The "web conference" students were also given headsets on loan for during the semester. In order for students to be exposed to sufficient web-conference learning, the standard four lab-sessions were insufficient. Instead, it was planned to schedule 13 out of the 14 lessons to be held in the lab for "web conference" students. However, due to a lack of lab availability, the Administration Department rejected this request. Instead, a

compromise of eight lab-sessions were scheduled for the class undertaking this study, while the other classes that did not take part in the study continued to be scheduled with the standard four lab-sessions. A longitudinal study was undertaken in each of the three semesters that started on 1 October 2012, 1 January 2013, and 1 April 2013, respectively. Full details on the procedures of the study are found in Chapter 3.

Research Questions

- In the context of SIM University, what are the differences in student achievement between students experiencing synchronous web-conference instruction and those experiencing traditional classroom-based instruction?
- How does class-size affect student achievement within a synchronous web-conference environment?
- What aspects of synchronous web-conference learning would enhance students' learning experience?
- What are the features of an effective pedagogical model that can be adopted in a synchronous web-conference context?

Learning Analytics. In addition to its synchronous instructional functions, a web-conferencing system also provided data in the form of system reports about learners such as: (a) session attendance, (b) the duration of attendance, and (c) recording-viewing statistics. This study also analyzed the data generated by the system. Apart from gaining a comprehensive picture of system utilization, such data also helped to inform stakeholders (academics and administrators) at UniSIM about the pedagogical benefits that a web-conferencing system could provide. For example, if a recorded session had a high viewer rate, it could mean that the topic

covered was a difficult one and that the students needed to view it again or simply that it was viewed by students who were absent from class. Data from learning analytics for investigating the relevant research question is discussed in Chapter 4.

Characteristics of the Learners

The DMS program had a combination of local and foreign Asian students. Local students were from Singapore while the foreign students came from ASEAN and East Asia countries. The proportion of local and foreign students in a typical DMS class was about 40% and 60%, respectively.

Kember (2000b) noted that there was a common perception that Asian students tended to rely on rote learning and passive learning. He cautioned that this perception "appeared to be impressionistic rather than informed by research" (p. 101). In his study based on evidence gathered from over 90 action research projects about the learning habits and motivation of Asian students, he found that Asian students can adapt to active learning if given the opportunity and that their perceived preference for rote and passive learning was "because they perceive that the course and assessment require them to reproduce bodies of material" for success in examinations (Kember, 2000b, p. 117). Kember concluded that Asian students were capable of and could benefit from more active forms of learning if given the opportunity in courses where the design of teaching, curricula and assessment promoted active learning.

In the context of Asian students' learning characteristics in the DMS program, the perception of passive learning as found in Kember's (2000b) study was not inconsistent with the anecdotal evidence reported by instructors who have taught in the program. The motivation behind this study was also to determine if the traditional methods of didactic teaching and

learning that took place in the classrooms could be re-designed to provide DMS students with more opportunities for active learning through web conferencing.

Summary

This chapter introduced the objective of this study, which was the introduction of web conferencing for a class of DMS students taking the Information Systems for Business course at UniSIM. The purpose was to examine students' learning achievement and their learning experience as well as to suggest a pedagogical model for web conferencing. Web conferencing was identified as a tool to solve the "one instructor, two labs" problem. In addition, this chapter also introduced the history and background of UniSIM, the importance of the study in relation to UniSIM's e-learning strategy, the DMS program, the potential of learning analytics, and the characteristics of Asian learners.

Organization of the Dissertation

The subsequent chapters of this dissertation covered (a) literature review, (b) research methodology and design, (c) data analysis, (d) discussion of results, and (e) conclusions. In Chapter 2, the literature review focused on web conferencing technology, the case for its adoption, a model for selection, and multimedia learning. On the pedagogical aspects of this study, action research was reviewed together with Laurillard's (2002) Conversational Framework because they provided a theoretical framework and methodology for studying pedagogy. In addition, various teaching and learning theories were discussed, followed by a review of a framework for integrating technology and pedagogy. In Chapter 3 on methodology, the mixed approach of combining quantitative and qualitative methods within action research was discussed together with a description of the research design and the investigation conducted. In Chapter 4, the data analyses conducted covered the various quantitative and qualitative data

obtained in this study, while Chapter 5 provided a discussion and interpretation of the results. Lastly, Chapter 6 discussed the study's limitations, which included (a) the researcher-instructor teaching the class under investigation, and (b) the students attending the computer-lab for web-conferencing learning; and the delimitations, which included (a) remote desktop support, and (b) the focus on a single course/discipline. Finally, possible areas for further research were also discussed.

Definition of Terms

- *Asynchronous Learning:* This term is used in reference to learners undertaking independent learning at their own time and that they do not learn together simultaneously.
- *Diploma in Management Studies*: The program in which the students for this study were enrolled.
- *E-learning:* Refers to learning undertaken by learners using the Internet and computer technologies; also known as online learning (e-learning can also take place offline without the Internet).
- *Learning Analytics:* Refers to a set of data generated by the synchronous web-conferencing system in relation to user characteristics such as frequency and duration of attendance.
- *Pedagogical Action Research*: An action research methodology that investigates one's own teaching and learning practice.
- *SIM University:* The University (in Singapore) in which the study was undertaken.
- *Synchronous Web Conferencing:* A web-based application for online, real-time teaching and learning.

Chapter II – LITERATURE REVIEW

This literature review examines the works of researchers and authors in relation to synchronous technology, and the issues and challenges it poses for teaching and learning. The chapter begins with a description of the literature selection process, followed by a discussion of the relevant topics including (a) an overview of synchronous technology, (b) the case for synchronous technology, (c) multimedia learning, (d) action research on pedagogy, (e) a theoretical framework for studying pedagogy, (f) learning theories, (g) instructional theories and principles, and (h) the integration of technology and pedagogy.

Literature Selection Process

Literature review, according to Creswell (2003), "shares with the reader the results of other studies that are closely related to the study being reported" (pp. 29 – 30). Krathwohl and Smith (2005), pointed out that a literature review could either be "a very thorough review of your dissertation field's literature" or "a highly selective review of such literature as bears directly on what you plan to do" (pp. 197 – 198). For the purpose of this study, a "highly selective" literature strategy was adopted to inform the reader of studies conducted in relation to web conferencing. A theme-based literature selection was adopted in reviewing the literature on (a) synchronous technology, and (b) pedagogy. With regard to synchronous technology, selected literature was examined in relation to its definition, trends and development, case for adoption, criteria for selection, and relevance to multimedia learning. With regard to pedagogy, the relevant literature reviewed includes: (a) action research based on Norton's (2009) Pedagogical Action Research, (b) Laurillard's (2002) Conversational Framework, (c) the various learning theories, and instructional theories and principles, and (d) Mishra and Koehler's (2006)

Technological Pedagogical Content Knowledge (TPCK) framework. Collectively, the selection and review of literature serve the purpose of supporting the investigation of the research questions and to inform the reader on the connection between the theoretical aspects and practical applications of this study.

Overview of Synchronous Technology

Synchronous technology can be distinguished as either one-way or two-way communication. Examples of one-way synchronous technology are live TV-broadcasts of major sporting events for which the audience watch on TV as the events happen in real-time. The communication process is one-way from the host TV-broadcaster to the audience, traditionally, via satellite or cable television and now, increasingly, over the Internet (Montpetit, Klym, & Mirlacher, 2010). In education and learning, examples of one-way synchronous technology come in the form of one-way live video or audio broadcasts (Simonson, Smaldino, Albright, & Zvacek, 2009). The focus of this literature review, however, is on two-way synchronous technologies. According to Bates (2005, p. 175), there are four types of two-way synchronous technologies:

- Audio-conferencing using standard telephone services;
- Narrow-band video-conferencing using standard or Integrated Services Digital Network (ISDN) telephone services;
- Broad-band video-conferencing using high-speed networks (fiber-optic and/or satellite);
- Synchronous conferencing over the Internet (Web-conferencing or Internet Protocol/IP-conferencing).

Synchronous web-based conferencing systems are an integral part of a technology that, as pointed out in the 2009 Horizon Report (K-12 Edition) (Johnson, Levine, Smith, & Smythe, 2009), "provides ways for teachers to help shape the constructive use of communication tools in the classroom." The report goes on to say that such technologies open up "a new world of [learning] experiences" for students and that "few other technologies available today have the ability to remove geographic and time limitations from school environments more quickly than online communication tools" (Johnson et al., 2009, p. 5).

In higher education, synchronous web-based conferencing technology has been used to support the teaching and learning requirements of an online Graduate Diploma in Information Technology program at Macquarie University, Australia, as part of a new approach to teach computer programming (Bower, 2008). Recognizing the importance of synchronous learning experience, Bower (2008) pointed out that "utilizing web-conferencing allowed synchronous learning experiences to be provided, and this was seen as particularly important for developing programming process knowledge." (p. 5).

Finkelstein (2006), in reference to the Partnership for 21st Century Skills assessment of abilities needed by learners to succeed in today's world, reported that "real-time collaboration, learning, and interaction can help advance the cause of skill development … such as, global awareness, interpersonal learning, and information and communication technology" (p. 11). While recognizing the use of web conferencing systems are not the only method to prepare learners with skills essential for success in today's workplaces and communities, Finkelstein (2006) argued that "they are undeniably well-suited and should be seriously considered as we [instructors] craft learning experiences that prepare students for today's real-world challenges" (p. 11).

Development of Synchronous Technology

Synchronous technology used for teaching and learning has come a long way from its early beginnings to the present. Early developments of synchronous systems have tended to be in-house, non-commercial projects undertaken by system specialists and academics for use in their own universities. They included systems such as Cyclops (McConnell, 1983) developed by the UK Open University; the Agora Project (Fish & Gonzalex Losa, 2007) at the University of Lancaster, UK; and MBone (multicast backbone) tools, partly developed by the University College London's Network and Multimedia Research Group (University College London, 2009). Today, most higher-education institutions have adopted commercial synchronous web-based systems that offer a variety of functions such as chat and video, for example (The Open University, 2009).

Typically, a synchronous web-based system would provide instant feedback tools to enable learners to demonstrate their social and learning presence such as buttons for emoticons, hand-raising, and voting. For in-session activities to be carried out by small groups, the instructor/moderator can also create "breakout rooms" whereby a small group of selected learners can be "moved" to a particular sub-group or "room." Other more advanced forms of synchronous instruction include the use of application and desktop sharing in which individual applications such as Word and Excel or the entire desktop running on the instructor/moderator's computer could be shared across the Internet onto the learners' computer screens in real-time. Lastly, the video recording feature can make the synchronous session (including application or desktop sharing activities) become asynchronous for viewing by students.

Despite being classified in the commercial domain, some developers and vendors offer systems free-of-charge. Kane and Baggaley's (2002) review of free synchronous online

collaborative tools identified the following: (a) NetMeeting, (b) ICQ, (c) Roger Wilco, (d) PalTalk, and (e) Stuffincommon.

For fee-based, commercial systems, a variety of synchronous technologies are provided by the major software companies, which include Adobe® Connect, Elluminate®, IBM® Lotus SameTime and LotusLive, iVisit, Microsoft® Office Live Meeting, Skype, and Cisco® WebEx (Karabulut & Correia, 2008). Elluminate® was originally selected for this study. Until mid-2011, Elluminate® was an independent company and the provider of the ElluminateLive! (Version 10) web-conferencing system. In July 2010, Elluminate® was acquired by Blackboard® (Elluminate, 2010) and the system became known as Blackboard Collaborate Web Conferencing Version 11 (Blackboard, 2011a).

According to de Freitas and Newmann (2009), a synchronous system that collectively provides participants with the basic tools for synchronous communication has the following three core functions: (a) live audio and video; (b) shared visuals and/or whiteboards; and (c) text chat. Normally, a presentation such as a Powerpoint file is uploaded onto the whiteboard by the instructor/moderator either before or during the synchronous session. The uploaded presentation would then be used by the instructor for lesson-delivery in a virtual, real-time classroom. Students would attend the session by login through a hyperlink generated by the system. If the instructor chooses to use the webcam then his/her face would appear on the video for the students to see otherwise they would hear the audio only. Everyone would use a headset for audio communication. For non-verbal communication, students would interact with their peers and the instructor using the text-chat function. In order to ensure that audio is communicated in an orderly manner among students, a hand-raise button is available for each student to use to "raise" his/her hand before asking a question. This mode of web-conferencing teaching and

learning mirrors closely to a face-to-face lecture in a physical classroom except that the communication and interaction is taking place online in real-time.

Comparison of Synchronous Technology

A comparative study of various synchronous technologies was conducted by Karabulut and Correia (2008). They reviewed four web-based conferencing systems: Skype, Elluminate, Adobe Connect, and iVisit. The core functions of each system together with its advantages and disadvantages are summarized in Table 1.

Table 1

Comparison of Web-conferencing Systems

	Core Functions	Advantages	Disadvantages
Skype	Audio, video, file-sharing, text-chat with log file	Free; compatible with Mac and Windows; good quality audio and video; supports multiple participants; easy to download and use.	File-sharing is very slow; no audio or video recordings (requires third party software); unsuitable for large group of participants (but quite efficient for a maximum of 9 participants); no whiteboard; no application sharing.
Elluminate	Audio, video, file-sharing, text-chat with log file, session recording, whiteboard, application sharing, emoticons, hand-raising, break-out rooms, polling, writing and drawing tools.	Good audio and video quality; supports large group of participants (500 maximum); compatible with Mac and Windows; easy-to-use; integration with learning management systems; supports different types of user- internet connections; index-search of recorded sessions	Cost; considered to be a teacher-centered classroom environment (because permission to use most of the functions is controlled by the moderator); only one person can use video at a time; complicated installation manual (over 200 page).
Adobe Connect	Audio, video, file-sharing, text-chat with log file, session recording, whiteboard, application sharing, emoticons, hand-raising, break-out rooms, polling, writing and drawing tools.	Good audio and video quality; supports large group of participants (500 maximum); compatible with Mac and Windows; easy-to-use; integration with learning management systems; supports different types of user- internet connections; mobile-device support.	Cost; does not allow for instant uploading of Word documents (needs PDF conversion first); supports basic, strip-down Powerpoint files only (would not upload with sound, special effects and/or large pictures); does not allow for more than three active web cameras at one time; no index-search of recorded sessions; also a teacher-centered environment.
iVisit	Audio, video, file-sharing, text-chat with log file, session recording, whiteboard, and application sharing.	Cost-effective (iVisit Plus is only $15/year) and free (iVisitLite); compatible with Mac and Windows; easy-to-use; mobile-device support.	Limited to a small group of participants (maximum 16).

Note. Adapted from "Skype, Elluminate, Adobe Connect, iVisit: A comparison of web-based video conferencing systems for learning and teaching," by A. Karabulut, and A. Correia, 2008, *Proceedings of Society for Information Technology & Teacher Education International Conference*, pp. 481 – 484.

An important element of any computer applications, including web-conferencing systems, is the system's user interface because it determines the system's user-friendliness and ease-of-use. User interface provides the "look and feel" of the system to the user and a good user-interface design helps to promote a positive user experience. A comparison of the user interface between Elluminate and Adobe Connect (Elluminate, 2010; Adobe, 2012) is illustrated in Figure 1.

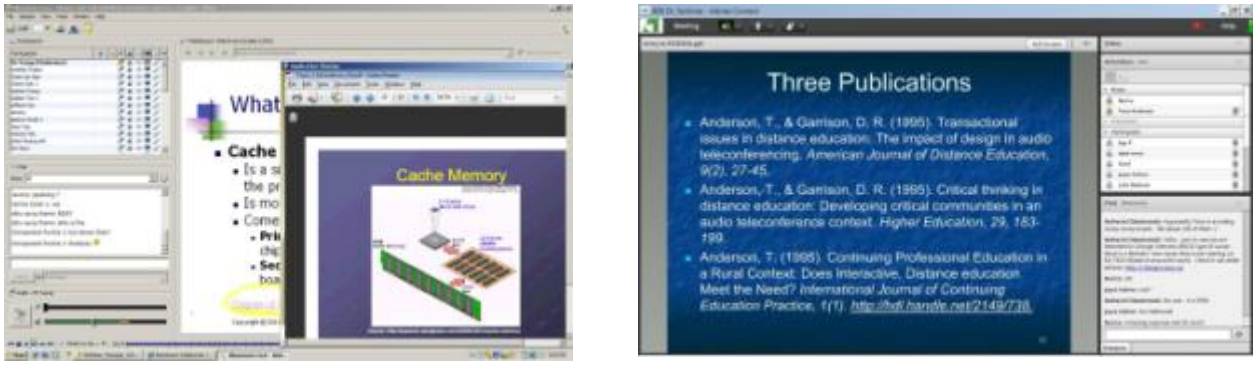

Figure 1: User interface of Elluminate and Adobe Connect (Source: Elluminate, 2010; Adobe, 2012)

In addition to user interface design, a comparative review of Elluminate and Adobe Connect was carried out by Schullo and Hilbelink (2007). They found that while both systems offered similar functionalities, differences existed in terms of usability, content display, and audio transmission. A summary comparison of the two systems based on current technical information (Blackboard, 2012b; Adobe 2012) is shown in Table 2.

Table 2

Comparison between Elluminate/Blackboard Collaborate and Adobe Connect

	Elluminate/Blackboard Collaborate	Adobe Connect
Usability	Remote desktop control capability via Desktop Sharing. Improved, modern, highly accessible, and intuitive user interface: one-click access to common functions. Single-click launch of web conference session from instant messaging session. Supports multiple languages: English, Spanish, French and Arabic Improved access for users with disabilities through improved keyboard navigation and screen reader support. Mobile access for iPad, iPhone and Android devices.	Remote desktop control capability via Desktop Sharing. Simplified user experience through a new user interface. All functions can be easily discovered through better interface-organization. Advanced chat into separate tabs for public and private conversations. New views allow presenters to quickly get vote counts and control breakout sessions. Optimized screen display through intelligent re-size of screen or resolution. Mobile device access for iPad, iPhone, and Android devices.
Content display	Improved live video experience. Shared content that includes: Web Tour for quick and direct launch of web-pages Embedding HTML content in Chat Reusable Whiteboard	Enhanced Whiteboard tools that include the ability to create customer shapes and to easily add text to shapes. The whiteboard can also be used in the overlay mode on top of a shared document. Rich multimedia: share a variety of content types including animated presentations, images, audio and video. High-quality video conferencing
Audio transmission	Asynchronous voice authoring and recording capabilities to enable instructors to create: Podcasts Voice e-mail Voice feedback to students	Richer audio experience with better integration with third-party audio providers. Enhanced audio (and video) controls: access audio (and video) controls centrally. Two-way voice communication support for VoIP and telephone audio.

Note. Adapted from *Blackboard Collaborate 11 What's New*, by Blackboard, 2012, Retrieved from http://www.blackboard.com/Platforms/Collaborate/Resources/Collateral.aspx. Adapted from *Adobe Connect 8 Features*, by Adobe, 2012, Retrieved from http://www.adobe.com/products/adobeconnect/features.html.

While both synchronous systems were considered to be equally suitable for this study, the fact that UniSIM uses the Blackboard LMS and the researcher's prior positive experience of Elluminate made it the system of choice in this study on web conferencing.

Evaluation of Synchronous Technology

In a study on the deployment of web conferencing systems at the University of Southern Queensland (USQ) (Reushle & Loch, 2008), Elluminate was found to be "the preferred choice of web conferencing software because of its cross platform functionality … and because it appeared to offer all that other commercial tools offer plus more features" (p. 21). These additional features included application sharing and recording as well as the standard functions (i.e., whiteboard, audio- and text-based chat). USQ conducted two phases of trial Elluminate deployment: Phase 1 included lessons conducted by two USQ faculty-members via Elluminate for two fully online postgraduate courses in the Faculty of Education and one undergraduate course in Mathematics; Phase 2 extended this trial to encompass two introductory training sessions endorsed by the USQ management plus a number of additional sessions to give staff members practice in using Elluminate. Many positive feedback statements were obtained from the students in the two trials with "interactive and collaborative opportunities, enhanced social presence and a sense of community" (p. 23) being identified as the most beneficial experiences of synchronous learning for students. Feedback from faculty members who participated in the trials was also positive. In particular, Reushle and Loch (2008) reported that "their [the faculty members'] use of the software to invite guest speakers from across the globe to contribute to their students' learning experience" (p. 25) and the recording features were found to be most beneficial.

Apart from USQ, Elluminate (now Blackboard Collaborate) is also used by the UK Open University (The Open University, 2009) and Australia's Southern Cross University (Rowe & Ellis, 2010). Athabasca University in Alberta, Canada, also used Elluminate until February 2011 when it switched to Adobe Connect (Athabasca University, 2011). In the United States, various higher education institutions have also adopted Blackboard Collaborate as their synchronous system (Blackboard, 2012a). In Asia, apart from UniSIM, Blackboard Collaborate is used by the Hong Kong University of Science and Technology (HKUST, 2012), while Adobe Connect is used by the Chinese University of Hong Kong (CUHK, 2011), WebEx by the National University of Singapore (NUS, 2013), and ACUConference by Nanyang Technological University, Singapore (NTU, 2013).

Criteria for Selecting Synchronous Technology

Since the beginning of the 21st century, educational researchers have shown much interest in the potential of synchronous web-based conferencing and viewed it as the "next generation" technology for teaching and learning especially in distance education (Barron, 2001; Gillan & McBride, 2000). Enthusiasm aside, technology should be evaluated according to an institution's teaching, learning, and organizational needs. Bates' (1988) ACTIONS and Bates and Poole's (2003) SECTIONS frameworks are two models for evaluating technology. A comparison between the evaluation criteria of the ACTIONS and SECTIONS models is shown in Table 3.

Table 3

Evaluation criteria of the ACTIONS and SECTIONS models

ACTIONS	SECTIONS
A – access	S – student
C – costs	E – ease of use
T – teaching and learning	C - costs
I – interactivity	T – teaching and learning
O – organizational issues	I - interactivity
N – novelty	O – organizational issues
S – speed	N - novelty
	S – speed

Note. From *Technology, E-learning and Distance Education* (p. 65), by A. W. Bates, 2005, London and New York: Routledge. Reprinted with permission.

According to Bates (2005), the ACTIONS framework "has been used successfully by a number of organizations as a framework for selecting, using and evaluating technology in distance education" (p. 65). The ACTIONS framework was subsequently revised and became the SECTIONS framework. Its purpose was "for choosing technologies for campus-based learning" (p. 65) by taking student access and ease-of-use into consideration. In view of the campus-based context of this study, the SECTIONS framework was used to assess Blackboard Collaborate.

West (2010), in a study of an online course for Project Executives at IBM used the SECTIONS model to analyze the technology-related aspects of the course including synchronous technology. A comparative study was undertaken between Elluminate and LotusLive. The latter web-conferencing system was chosen for reasons of cost and organizational issues (LotusLive is an IBM product). However, West (2010) noted "it's quick to send out a URL to students to participate in a Lotus Live or Elluminate web conference session once the host/instructor has set up their personal conference ID" (p. 13), indicating that Elluminate was considered comparable to LotusLive in categories such as speed of session creation.

Synchronous Technology and Pedagogy

In relation to pedagogy, a study that is of interest and relevance here is Montgomerie and King's (2006) research conducted for the Northern Alberta Institute of Technology (NAIT) to evaluate the use of IP videoconferencing in an apprenticeship training course. Two models of delivery were examined: (a) the NAIT DATE (Distance Apprenticeship Training and Education) model, and (b) the "two-classroom" model. In the former model, students received their training in their local community (instead of going to the technical college to attend face-to-face lessons) via videoconferencing from the instructor who was based in the NAIT main campus, while the latter involved a "two-classroom" arrangement in which the instructor and one class were located at the NAIT main campus linking up via videoconferencing with another class at a remote campus. In both models, the study concluded that "the students were successful and able to access their training from their home community" (p. 73). The "two-classroom" model is of particular relevance in that the videoconferencing arrangement was based on the instructor and one class being located at the NAIT campus, while a second class was located at a remote campus. This dissertation/research study reported herein adopted a similar two-location design in which the instructor and students were located in one room while the remaining students were located in another room.

Other relevant studies. In their study on the advantages and disadvantages of Blended Online Learning Design (BOLD) for graduate-level course design and delivery in two Canadian universities, Power and Vaughan (2010) provided a conceptual framework that related closely to this study. Defined as "a combined asynchronous-mode ….. and synchronous-mode learning environment" (p. 22), BOLD is a concept that promotes the blending of synchronous online learning with the more widely practiced form of asynchronous-, learning management system

(LMS)-based learning. According to Power and Vaughan (2010), BOLD represents "a completely online, course delivery system" (p. 23). While this study was not completely online, it could be represented in relation to the BOLD framework according to the diagram shown in Figure 2.

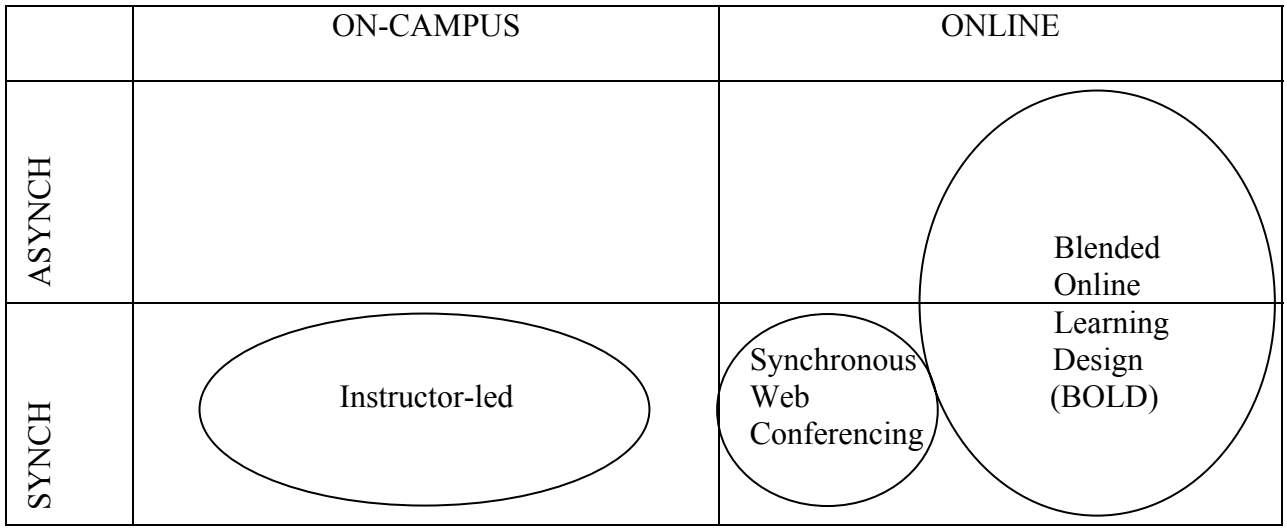

Figure 2. The Blended Online Learning Design (BOLD) Framework. Adapted from Redesigning Online Learning for International Graduate Seminar Delivery. *Journal of Distance Education, 24*(2) 19-38, by M. Power, and N. Vaughan, 2010.

Irvine's (2012) research on multi-access learning conducted in the Technology Integration and Evaluation (TIE) Research Lab at the University of Victoria is another study that is highly relevant to this study because of the dual-mode nature of the learning environment in which students learn concurrently in face-to-face mode or remotely via video conferencing. The challenge of making her multi-access learning environment working at the TIE Research Lab, which she described as "blood, sweat, and tears," while discussing her research project with EDDE806 students on 10 October 2012, resonated with the technological challenge of implementing web conferencing in this research study. In addition, Lee's (2009) study on synchronous computer-mediated communication in the teaching of spoken English is also relevant but its findings are somewhat weakened by the use of two systems (Skype and Adobe

Connect) and the small sample size (15 participants initially but ended up with 7 because of 8 dropouts). Furthermore, Nagendran's (2011) study on the efficacy of an e-KM (knowledge management) computer model for medical students was also reviewed. While e-KM is an asynchronous learning system, the similarity of her study in terms of sample size, research design, quantitative data analysis, and results, in comparison with this study, is revealing in that no significant difference was found in the performance of medical students in the University of Alberta who received their learning via e-KM and those who received face-to-face learning directly from the surgeon instructor (Nagendran, 2011).

Multimedia Learning

A discussion on multimedia learning should begin by distinguishing the difference between media and mode as these two terms are commonly associated with multimedia learning. In the context of multimedia learning, media refer to the delivery channels or vehicles that deliver an instruction (Clark, 1994). For example, the computer and the Internet are the media through which an instruction gets communicated from the instructor to the students online. Mode refers to the way an instruction is communicated through the media or medium. Examples of the mode of instruction would include text, still graphics, audio and video (Fahy, 2004). Given that instruction delivered via web conferencing usually involves multimedia content accompanied by human-sensory inputs such as sound and visual (screen-pointer and highlighter), it is therefore appropriate to discuss the topic of multimedia learning. In particular, Mayer's (2005) cognitive theory of multimedia learning and Paivio's (1986) dual-coding theory are examined in this literature review.

According to Mayer (2005), *multimedia* refers to "presenting materials in two or more forms" that include both "words (such as spoken text or printed text) and pictures (such as

illustrations, photos, animation, or video)" (p. 2); *multimedia learning* refers to "the learner's construction of knowledge" based on multimedia (p. 2).

The cognitive theory of multimedia learning is based on the belief that people learn better from words and pictures than from words alone, and is underpinned by the following three assumptions: (a) dual-channels – that "the human information processing system includes [separate] channels" for visual and auditory information processing, (b) limited capacity – that "each channel has limited capacity for processing," and (c) active processing – that "active learning entails carrying out a coordinated set of cognitive processes during learning" (Mayer, 2005, p. 31). For meaningful learning to occur, Mayer contends that learners need to engage in the following cognitive processes: (a) "selecting relevant words for processing in verbal working memory," (b) "selecting relevant images for processing in visual working memory," (c) "organize selected words into a verbal model," (d) "organize selected images into a pictorial model," and (e) "integrate the verbal and pictorial representations with each other and with prior knowledge" (Mayer, 2005, p. 38). Given that teaching and learning in web conferencing would depend on instruction that is represented by a combination of audio, text and visual modes, delivered via the media of the computer and the Internet, understanding of Mayer's theory is especially important in order to provide learners with a good learning experience in this real-time, online environment.

Dual-coding theory (Paivio, 1986) refers to the ability of human for processing and storing visual and verbal information in dual channels (i.e., visual and verbal). The underlying assumption of this theory is that text is processed and encoded in the verbal system while pictures are processed both in the visual and verbal systems. As a result, learners may remember

pictures and concrete items better than abstract text because pictures and concrete items are: (a) encoded twice (i.e. in both the visual and verbal channels), and (b) they have concrete (observational) value. For example, in distinguishing between the concrete and the abstract, Clark and Paivio (1991), pointed out that it is the "strength of word-to-image referential connections … concrete words such as book, teacher, bunsen burner, and blackboard denote tangible objects," while abstract words "such as ability, success, effort, mass, and learning-disability do not refer to concrete, tangible objects" (p. 155). Furthermore, Paivio's (1986) dual-coding theory also posited out that reading and listening, when carried out simultaneously, would actually interfere with learning as both activities need to utilize a learner's verbal channel. In order to ensure proper learning between learners, contents, and the instructor in web-conferencing, the amount of abstract text that appears on the whiteboard should be kept to a minimum and that the information be expressed and displayed in concrete, point form, supported by images whenever possible, so as not to overload learners' verbal channel when the instructor delivers his/her verbal explanation at the same time as the learners reading the information. By keeping learners' activation of their verbal channel to a minimum for reading abstract text while they listen to the instructor's verbal explanation, which also utilizes their verbal channel, learners' ability to absorb both text-based and verbal information would be higher in comparison to learners who are required to read a larger amount of abstract text while listening to the instructor's verbal explanation simultaneously. On their preference for using concrete information over abstract text, Clark and Paivio (1991) pointed out that "lessons containing concrete information and evoking vivid images will be easier to comprehend and remember than lessons that are abstract and not image-arousing" (p. 24).

Action Research

While action research is discussed in the Methodology chapter, given that it is the research paradigm chosen in this study, a review of the literature is essential in order to obtain clarity about this methodology from both the historical and contemporary perspectives.

Paradigmatically, action research is said to be aligned with the participatory or emancipator paradigm (Creswell, 2009; Cohen, Morrison, & Manion, 2008). Action research as a methodology had its origin from the work of Kurt Lewin, a German psychologist, who first coined the term "action research" in his paper "Action Research and Minority Problems" (Lewin, 1946). Originally, action research began as a methodology which examined social problems through actions that led to social changes. Over the years, it has evolved and been adopted by researchers for studying a diverse range of problems including teaching methods, learning strategies, evaluative procedures, attitudes and values, teacher professional development, management and control, and administration (Cohen et al., 2008). Definitions of action research (as cited in Cohen et al., 2008, p. 297) include the following:

- Hopkins (1985) - "the combination of action and research renders that action a form of disciplined inquiry, in which personal attempt is made to understand, improve and reform practice"
- Ebbutt (1985) - "a systematic study that combines action and reflection with the intention to improve practice"
- Cohen et al. (2008) - "a small-scale intervention in the functioning of the real world and a close examination of the effects of such an intervention."

Kember (2000a) provided a more comprehensive definition by identifying the major characteristics of action research, which included (a) social practice, (b) aimed towards

improvement, (c) cyclical, (d) systematic enquiry, (e) reflective, (f) participative, and (g) determined by practitioners.

One of the underlying principles of action research is its emphasis on the researcher as a participant in the research process and that new knowledge is developed through the actions of the researcher. This principle is relevant here in that the researcher is actively involved in studying the pedagogical problems and ideas arising from the use of web-conferencing technology at UniSIM.

One common criticism of the "researcher as a participant" is bias or a lack of objectivity in the research process. According to Iacona, Brown, and Holtham (2009), "Bias arises from two sources: the influence of the researcher over participants' behaviors and the impact of the researcher's own beliefs" (p. 41). However, they argued that there are situations in which it is necessary for the researcher to participate in the research process. Citing Iacona's PhD thesis on "Factors Affecting the Viability of Electronic Marketplaces: an Empirical Investigation into International Steel Trading" as an example in which the author also worked in her company as a trader and manager while investigating her research problem about electronic marketplace in steel trading, Iacona et al. (2009) argued that "In order to understand the role of the steel trader it is necessary to understand the business environment, the culture, the business practice and the interpersonal relations" (p. 44). As a participant-researcher working inside the industry while undertaking her research, the author was able to capture the tacit knowledge of the steel industry. Iacona et al. (2009) recommended several steps to take in minimizing the subjectivity and/or lack of rigor of the research including (a) analyze the evidence objectively through triangulation of

the data, and (b) distinguishing as appropriate facts from personal reflections, both of which are discussed in the subsequent chapters of this dissertation.

In terms of process, the UK Open University (2005) describes action research as a methodology based on a cyclical, four-stage process involving: planning, acting, observing, and reflecting. “The action research process usually starts with a question ... about [a problem] ... The cycle continues as you decide on some action. The process is … a spiral: reflection on your action and your findings may lead to another question and further action” (p. 5).

Norton (2009) defined pedagogical action research (PAR) as a methodology which “systematically investigates one’s own teaching/learning facilitation practice, with the dual aim of improving that practice and contributing to theoretical knowledge in order to benefit student learning” (p. 59). She clarified that pedagogy refers to “the principles of learning and teaching” (Norton, 2009, p. 59). A key characteristic of PAR is based on a cyclical process which involves “spirals of reflection, planning, acting, observing and reflecting” (p. 55). Specifically, Norton (2009) recommended the following five-step process (known by the acronym, ITDEM) in carrying out a study on PAR:

1. Identifying the problem, paradox, issue, or difficulty
2. Thinking of ways to tackle the problem
3. Doing it
4. Evaluating it (actual research findings)
5. Modifying future practice

The ITDEM five-step process aims to help researchers with their own research in “teaching or learner-support practice and the effects that this has on their students’ learning” (p. 70). As an

example, she illustrated a one-cycle action research project on helping psychology students write better essays by mapping out the five-step process summarized in Table 4.

Table 4

Pedagogical Action Research Cycle

Step	Process
I	Students were not using many journals in their essays.
T	Asking the students (a qualitative, interpretivist approach)
D	Carrying out an in-depth unstructured interview
E	Evaluate the qualitative data using content analysis
M	Modify practice by building extra support with journal use.

Note. Adapted from *Action Research in Teaching and Learning: A Practical Guide to conducting Pedagogical Action Research in Universities* (pp. 70-76), by L. S. Norton, 2009, London and New York: Routledge. Reprinted with permission.

While the above pedagogical action research study of Table 4 is based on qualitative, interpretivist methodology, Norton (2009) pointed out that the study could also be based on an experimental, positivist approach involving the design of an intervention. In short, she explained "that a multi-methodological approach is best suited to the ultimate goal of pedagogical action research" as it helped to "modify our own practice" (p. 115).

The Conversational Framework

While pedagogical action research provides a mechanism for investigating pedagogy, Laurillard's (2002) Conversational Framework offers a theoretical framework for action researchers "to design and test an optimally effective learning experience" and "to harness technology to the needs of education" (Laurillard, 2008, p. 1). The Conversational Framework views "learning as a relationship between the learner and the world, mediated by the teacher" (Laurillard, 2002, p. 86) and offers a teaching strategy for any learning situation. Specifically, the Conversational Framework recommends a teaching and learning process with the following characteristics:

- it must operate as an iterative dialogue;
- it must be discursive, adaptive, interactive and reflective; and
- it operates at two levels: discursive and experiential

The four kinds of teaching and learning processes as recommended by the Conversational Framework are summarized in Table 5.

Table 5

Teaching/Learning Processes Associated with the Conversational Framework

Process	Activities
Discursive	Teacher and students converse at the level of descriptions of the topic goal
Adaptive	Teacher and students adapt their actions to the task goal (in light of the task goal)
Interactive	Teacher and students interact on the task (in light of the task goal)
Reflective	Teacher and students reflect on the interaction of the task

Note. Adapted from *Rethinking University Teaching* (p. 86), by D. Laurillard, 2002, London and New York: Routledge Falmer. Reprinted with permission.

Laurillard (2008) provides the examples below to illustrate the two operational levels of the Conversational Framework.

- Discursive level – The teacher and students exchange theoretical ideas and concepts, discuss, ask questions, comment, critique, articulate alternatives, and students do the same with each other. Learning is achieved through listening, reading, writing, discussing, communicating, debating, articulating, and presenting.
- Experiential level – The students work within the learning environment constructed by the teacher (e.g., an experimental lab, field trip, practice class, problem class, exercises, rehearsal, simulation), and students exchange their practice outputs, working on them together. Learning is achieved by doing, practicing, rehearsing, analyzing, testing, making, and building.

Community of Inquiry

The Community of Inquiry (COI) is a model that offers a theoretical framework about the three essential elements that are fundamental to higher education that takes place in computer-mediated-communication (CMC) and computer-conferencing environments (Garrison, Anderson, & Archer, 2000). These three elements or presences include (1) cognitive presence, (2) social presence, and (3) teaching presence. When an instructor and his/her students experience these three presences in a CMC-based educational setting, a Community of Inquiry is said to have formed, fostering "a worthwhile educational experience" (Garrison et al., 2000, p.88) as illustrated in Figure 3.

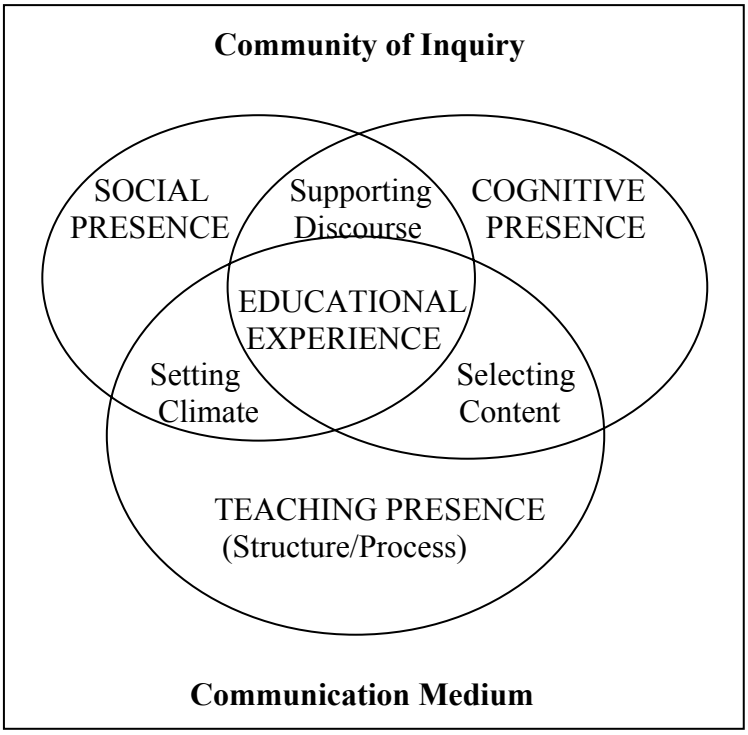

Figure 3. The Community of Inquiry (COI) Model. Adapted from Critical Inquiry in a Text-based Environment: Computer Conferencing in Higher Education. *The Internet and Higher Education, 2*(2-3) 87-105, by D. R. Garrison, T Anderson, and W. Archer, 2000.

According to Garrison et al. (2000), cognitive presence refers to "participants….of a community of inquiry are able to construct meaning through sustained communication," while social presence is defined as "the ability of participants in the Community of Inquiry to project their

personal characteristics into the community" (p. 89). The third element, teaching presence, is the primary responsibility of the instructor and it is made up of two functions: (1) design of the educational experience and (2) facilitation, which is "a responsibility that may be shared among the teacher and …. students" (p. 90).

Learning Theories, Instructional Theories and Principles

Literature relating to the major branches of learning theories and the theories and principles of instruction are reviewed in this section in order to examine those most appropriate for teaching and learning within a web conferencing environment.

Learning theories. The major branches of learning theories include: (a) Behaviorist, (b) Cognitive, (c) Constructivist, (d) Humanistic, and (e) Social Learning, and they are reviewed below.

Behaviorist theories. Influenced by Thorndike (1913), Watson (1924), Pavlov (1927) and Skinner (1974), behaviorist theories take the view that an individual's behavior, including attitude, can be predicted based on a set of stimulus-response events and that learning is considered as a form of behavior modification. Therefore, according to these theories, the teacher has the responsibility to create an environment in which the correct behavior of the student is reinforced (Roffe, 2004, pp. 68-69).

Cognitive theories. These theories are concerned with how humans process information and how human memory works in relation to learning. According to Saettler (1990a), cognitive learning theories emphasize "knowing rather than responding … and views the individual as active, constructive, and problem solving rather than as a passive recipient of environmental stimulation" (p. 318). Piaget (1970) and Bruner (1966) are two prominent cognitive theorists of the 20th century. Piaget held the view that a learner's cognitive development is achieved "through

the continuous interaction between learner and environment" (as cited in Saettler, 1990b, p. 73). In his study of a child's cognitive development from infant to adolescent, Piaget formulated a four-phase cognitive model that encompassed: (i) sensory-motor, (ii) preoperational, (iii) concrete operations, and (iv) formal operational. Cognitive development, from infancy to adolescent, becomes more and more complex as the child interacts with the external environment. Upon reaching adolescence and cognitive maturity, the child's view of the world changes from subjective to objective and from physical to abstract (Saettler, 1990b, pp. 74 – 77). Contrary to Piaget's view of a learner's cognitive development through experience, Bruner (1966) argued that learning was an active process between the learner and the learning material and that a learner was capable of learning any material so long as the instruction was organized appropriately. In his "spiral curriculum," Bruner (1960) proposed a teaching approach in which each subject or skill area was revisited at intervals and at a more sophisticated level each time of the revisit.

Constructivist theories. These theories have their origins in Piaget's (1970) cognitive theories, which viewed learning as an active process (experience) of interaction between the learner and the environment. Constructivists see the goal of education as helping students to construct their own understanding through situated learning based on real-life situations in which the environment offers a rich source of information for learning. According to Roffe (2004), students are "active constructors of knowledge, by integrating and combining new information with their own experiences and prior knowledge" (p. 71). There are two primary forms of constructivism: personal and social. Personal constructivism "focuses on transformations of understanding in the minds of individual learners, such as the individual's existing understanding, knowledge and interests and how these extend through personal interactions with

events in their daily lives" (Roffe, 2004, p. 71), while social constructivism "focuses on the growth of subject matter for individuals in social domains … on how an individual makes sense of experiences from socially-shared perceptions" (p. 72). Furthermore, "active learning," "discovery learning," and "knowledge building" are also very much part of the constructivist paradigm whereby students are free to explore learning within a given framework and aspects of constructivism can also be found in "self-directed learning," "transformational learning," "experiential learning," and "reflective practice" (Reach Information Portal, 2009).

Humanistic theories. Espoused by Maslow (1968), Freire (1972), and Rogers (1951), humanistic theories consider the process of learning as aligning to the learner's own interests, values, and opportunities for study and practice. Learners are responsible for setting their own learning goals on the path of development towards self-actualization and realizing inherent potential (Roffe, 2004, p. 80).

Social learning theory. This theory is principally the work of Bandura (1986) who viewed that learning can be achieved through observing the behaviors of others and that an individual learns by imitating the behavior of a role-model (usually the instructor). A person's cultural background also plays an important role in influencing his/her thinking as "culture is the prime determinant of the development of an individual … culture provides a student with what to think … [and] how to think." (Roffe, 2004, p.79).

Learning theories and DMS learners. The learners from UniSIM's Diploma in Management program who participated in this study can generally be described as having a style of or preference for learning that is characterized by behaviorist theories. This claim is based on anecdotal evidence provided by instructors in the DMS program over the years about students' reliance on instructors for their learning as well as from end-of-course student feedback (the

emphasis on instructors to assist students on examination matters). One of the possible reasons behind this kind of "stimulus-response" style of learning could be due to the students' age profile (between 18 to early 20s) and the pressure of academic competition. Another reason could be due to the instructor-centric learning environment in which the traditional, rigid structure of face-to-face learning in a lecture theatre has been the norm in the DMS program.

Instructional theories and principles. According to Reigeluth and Carr-Chellman (2009), the theories of instruction broadly cover both approaches to instruction and outcomes of instruction. Essentially, the different kinds of approaches to instruction include (a) direct approach (Huitt, Monette, & Hummel, 2009), (b) discussion approach (Gibson, 2009), (c) experiential approach (Lindsey & Berger, 2009), (d) problem-based approach (Savery, 2009), and (e) simulation approach (Gibbons, McConkie, Seo, & Wiley, 2009). Outcomes of instruction, on the other hand, are related to (a) skill development outcomes (Romiszowski, 2009), (b) understanding outcomes (Wiske & Beatty, 2009), (c) affective development outcomes (Bichelmeyer, Marken, Harris, Misanchuk, & Hixon, 2009), and (d) integrated learning outcomes (Beatty, 2009).

Regarding instructional principles, Merrill's (2009) First Principles of Instruction are reviewed because of their universal applicability under different kinds of instructional situations. This claim is supported through Merrill's definition of principles in which he claimed that "principles are not … a model or method of instruction, but rather relationships that may underlie any model or method … [and] can be implemented in a variety of ways by different models and methods of instruction" (Merrill, 2009, p. 43). Similarly, Clark (2003) also viewed an instructional principle as general and applicable to any delivery system or any instructional architecture.

Specifically, Merrill's (2009, pp. 43- 44) first principles of instruction comprise the following:

(a) Demonstration – "learning is promoted when learners observe a demonstration"

(b) Application – "learning is promoted when learners apply the new knowledge"

(c) Task-centered – "learning is promoted when learners engage in a task-centered instructional activity"

(d) Activation – "learning is promoted when learners activate relevant prior knowledge or experience"

(e) Integration – "learning is promoted when learners integrate their new knowledge into everyday world"

It follows that, according to Merrill (2009), any instructional theory or lesson plan or strategy adopted by instructors ought to include these five principles "to promote more effective, efficient, or engaging learning" (p. 43). A possible mapping of Merrill's (2009) first principles of instruction within the major branches of learning theories is shown in Table 6.

Table 6

Mapping of First Principles of Instruction with Learning Theories

	Behaviorist	Cognitive	Constructivist	Humanistic	Social Learning
Demonstration	X	X			X
Application	X	X	X		X
Task-centered	X	X	X	X	
Activation		X	X	X	X
Integration			X	X	X

This mapping is based on the characteristics of each branch of learning theories and their likely association with Merrill's (2009) five principles. For example, behaviorist theories were not considered applicable under the principles of activation and integration because of their emphasis

on learners' behavioral change and response to stimulation; whereas, "activation" refers to invoking learners' prior knowledge and "integration" through reflection and peer-critique (Merrill, 2009, pp. 50 – 53). Similarly, cognitive theories were considered incompatible with the "integration" principle because of their emphasis on cognitive development through experience (Piaget, 1970) and on interaction with the learning materials (Bruner, 1966). Furthermore, given their need for constructing their own understanding through situated learning, constructivists are unlikely to benefit from demonstrations, especially those in didactic format. Also, for humanistic theorists, who view learning as a form of self-fulfillment, they are less likely to benefit from Merrill's (2009) "application" principle which places emphasis on the rigidity of coaching and peer-collaboration (p. 47) as the instructional process. As for social learning theory, given that observing and imitating role models (peers and instructors) lie at the heart of the learning process, Merrill's (2009) task-centered principle which promotes learning through tasks instead of people makes it less compatible with social learning compared with the other principles.

For the purpose of identifying an instructional theory consistent with Merrill's (2009) First Principles of Instruction, Wiske and Beatty's (2009) theory on Fostering Understanding Outcomes is examined here because of its connection with teaching and technology which, like Merrill's (2009) principles, is also considered universal in meeting the learning needs associated with different learner characteristics. The key feature of this theory is Wiske's (1997) Teaching for Understanding Framework, which is made up of the following five universal elements:

(a) Generative Topics

(b) Understanding Goals

(c) Performance of Understanding

(d) On-going Assessment, and

(e) Reflective, Collaborative Community.

According to Wiske and Beatty (2009), each element focuses on integrating new educational technologies in order "to prepare students for work and citizenship in the 21st century" because "this era is marked by a transformation of information and communication technologies" (p. 230). Table 7 highlights the technological factors associated with each element of the Teaching for Understanding Framework (Wiske & Beatty, 2009, pp. 231 – 236).

Table 7

Technological Factors associated with the Teaching for Understanding Framework

Element	Technological Factors
Generative Topics	Networked technologies may enable teachers to access resources and up-to-date information on the Internet that helps students see connections between their lessons and problems or topics of authentic interest in the "real world."
Understanding Goals	New technologies may enable teachers to present lessons with multiple pathways that allow students to exercise some choice in the way they pursue their inquiry. Lesson materials presented in hyperlinked formats can help make goals clear and explicit by enabling students to link to reminders and supportive information.
Performance of Understanding	Computer software can help students make sense of difficult, closely related concepts by presenting dynamic, interactive simulations that may illustrate the workings of a key concept in ways that cannot be observed in nature or easily illustrated in a static medium. New technologies can enrich the range of ways that learners develop and demonstrate their understanding.
Ongoing Assessment	Multimedia technologies allow students to use multiple intelligences: mathematical-symbolic, kinesthetic-movement, verbal, visual, auditory, interpersonal, and intrapersonal-reflective in constructing and expressing their understanding. Potential of new technologies in support of revision and review. Capturing student products in digital forms greatly simplifies the process of revision by enabling students to reposition components of their work and change some weak parts while preserving other stronger parts.
Reflective, Collaborative Communities	Networked technologies may also help students share their work with diverse audiences and seek feedback from authentic critics outside their classroom. Online collaboration can be particularly beneficial in promoting reflection.

Note. Adapted from "Fostering Understanding Outcomes," by M. S. Wiske and B. J. Beatty, in C. M. Reigeluth & A. A. Carr-Chellman (Eds.), *Instructional-design Theories and Models: Building a Common Knowledge Base*, *Vol. III*, pp. 225 – 247. London and New York: Routledge. Reprinted with permission.

A Theoretical Framework for Technology and Pedagogy Integration

So far, this literature review has considered technology and pedagogy as independent, isolated concepts. While this is not an unusual approach, there is a theoretical framework that views technology and pedagogy as an interconnected and integrated event: the technological pedagogical content knowledge (TPCK) framework (Mishra & Koehler, 2006). The TPCK framework builds on Shulman's (1986) approach to pedagogical content knowledge (PCK) which provides teachers with a unified view of both "content (the actual subject matter that is to be learned and taught)" and "pedagogy (the process and practice or methods of teaching and learning)" (Mishra & Koehler, 2006, p. 1025). Historically, technology and pedagogy were considered to be discrete entities in teacher education (Shulman, 1986; Veal & MaKinster, 1999).

Recognizing the important influence that technology has on education, Mishra and Koehler (2006) extended Shulman's (1986) approach to include technology to form the TPCK framework. Central to this framework is the learning technology by design approach for teaching, which helps teachers to develop a "deep understanding" (Mishra & Koehler, 2006, p. 1031) of the complex relationships among content, pedagogy, and technology through "authentic design activities" (p. 1038).

Class-size

In their study on class-size, Blatchford, Basset, and Brown (2011) noted that in East Asia, many countries and cities have implemented the so called "small class teaching" initiative and that "pupils in small classes were likely to experience one-to-one teaching" (p. 718). Comparing a large class-size (30) with a small class-size (15), when it comes to task behavior (i.e. student on

task), class-size has no influence on students with higher learning ability. Their findings reported that "no significant effect of class size for pupils in the medium and high attainment groups … [compared to] a larger number of pupils [in the low attainment group] was associated with a decreased occurrence of on-task behavior" (p. 723). When it comes to receiving attention from and interaction with the teacher, Blatchford et al. (2011) reported the advantage of small class-size was evident in that "as class sizes became smaller there were more times when pupils were the focus of a teacher's attention, and more times when they were engaged in active interaction with teachers" (p. 727).

Summary

This literature review has examined literature relating to technology and pedagogy, the two central areas of this study. Under technology, synchronous systems and their capabilities have been discussed from historical to contemporary perspectives, including the case for their adoption and a discussion on multimedia learning according to Mayer's (2005) cognitive theory of multimedia learning and Paivio's (1986) dual-coding theory. As for a study on pedagogy, action research and Norton's (2009) pedagogical action research were introduced followed by a discussion of the Conversation Framework (Laurillard, 2002). In addition, the major branches of learning theories and instructional theories were also introduced followed by reviews of Merrill's (2009) first principles of instruction and Wiske's (1997) theory on teaching for understanding. Furthermore, the integration between technology and pedagogy, through Mishra and Koehler's (2006) TCPK framework and its learning technology by design approach, was also discussed. The objective has been to provide a theoretical and conceptual foundation in support of this study.

In the next chapter, the discussion will cover the procedures of the study first followed by research methodology and design. Under methodology, the case for adopting the mixed-methods approach and the use of action research to investigate pedagogy will be discussed. In terms of research design, the formation of the treatment and control groups in a quasi-experiment, the participation of student-volunteers, and the conduct of the investigation under UniSIM's teaching and learning contexts will be covered. A recap of the research questions as outlined in Chapter 1 is as follows:

- In the context of SIM University, what are the differences in student achievement between students experiencing synchronous web-conference instruction and those experiencing traditional classroom-based instruction?
- How does class-size affect student achievement within a synchronous web-conference environment?
- What aspects of synchronous web-conference learning would enhance students' learning experience?
- What are the features of an effective pedagogical model that can be adopted in a synchronous web-conference context?

Chapter III - METHODOLOGY

This study investigated the implementation of web conferencing within the context of UniSIM's teaching and learning environment. A group of students from the DMS Information Systems for Business (BUS017) course were invited to participate in web conferencing. The aims were to investigate the research questions introduced in Chapter 1. This chapter is divided into two parts. In part one, the procedures of the study are described, while in part two the study's research methodology and design are discussed.

Part 1: Procedures of the Study

For each semester that commenced on 1 October 2012 (Phase 1), 1 January 2013 (Phase 2), and 1 April 2013 (Phase 3), the procedures of this study are explained in relation to (a) the description of the teaching context, (b) the setup for web conferencing, (c) the course topics for web conferencing, (d) ethics, (e) feasibility, (f) other practical issues, (g) the asynchronous element of web conferencing, (h) the pilot study, and (i) timelines.

Description of the teaching context. The study was conducted over nine months and covered three semesters. In each semester, a class of 60 to 80 students from the DMS Information Systems for Business (BUS017) course was invited to participate, on a voluntary basis, in web conferencing. All the lessons, including those with web conferencing, were conducted by the researcher-instructor who is a full-time faculty member of UniSIM.

Enrolment in the BUS017 course was usually between 200 to 300 students per semester. The Administration Department, which handled class allocation, timetabling, and the appointment of instructors, would normally schedule three or four classes with 60 to 80 students per class and assigned the instructor to teach in each class. The BUS017 course had a total of 14

lessons in each semester. These were taught over a seven-week period with two lessons scheduled per week. The duration of each lesson was three hours, resulting in a total of 42 hours (3 x 14) of classroom time for all students.

A specific requirement of the BUS017 course was the provision of lab-based learning for students to learn website design and database development. Traditionally, four of the 14 lessons were conducted in the computer lab. This was the standard-timetable arrangement made by the Administration Department for each BUS017 class. However, because each computer lab could accommodate only 50 students, the administration department would allocate two labs plus one lecture theatre for each lab-based lesson. The lecture theatre was used for lab-activity briefing by the instructor and for students to register their attendance. This briefing normally took about one hour of class time. Thereafter, the instructor would ask the students to go to one of the two labs to work on a lab exercise. The instructor would continue with the computer-lab supervision over the remaining two hours, spending one hour in each lab consecutively to conduct lab-demonstrations and to supervise student projects.

Setup for web conferencing. In order to provide students with sufficient time to learn with web conferencing, the researcher-instructor realized that the standard four lab sessions were not sufficient. Instead, he had planned to conduct web conferencing in 13 of the 14 lessons but the Administration Department could not accommodate his request because of a lack of labs available. Instead, eight lab sessions were scheduled for his class. In each of these eight lab sessions, the researcher-instructor would work with two groups of students simultaneously: (1) the face-to-face or control group, and (2) the web-conferencing or treatment group. Students in the control group attended all 14 lessons in face-to-face mode, while students in the treatment group, who had voluntarily agreed to take part in web conferencing, attended eight lessons in the

computer lab. All students were informed during Lesson 1 which dates and topics web conferencing would take place. In each lesson that had web conferencing, all the students would begin the lesson in the lecture theatre first. The researcher-instructor would project his lesson notes in PowerPoint on the large projector-board including the web address of the web-conferencing session. For example: 'http://tinyurl.com/BUS017-S1-Oct12,' for web-conferencing Session 1 in the October 2012 semester. To begin the web-conferencing session, the researcher-instructor would ask students in the treatment group to go to the lab, connect their headsets into the computers, and login to the session. Students in the control group would remain in the lecture theatre together with the researcher-instructor who himself would also plug in his headset and login to the session as the moderator. When all the students in the treatment group had login and tested their audio, the web-conferencing session would begin with the researcher-instructor turning on his webcam to appear on video. The web-conferencing session (see Figure 2) including the video that appeared on the instructor-computer would also be projected onto the big screen for all the students in the control group to see in the lecture theatre. The researcher-instructor would conduct the lesson by speaking to both groups of students simultaneously via (1) face-to-face mode for the control group, and (2) web-conferencing mode for the treatment group. After the web-conferencing session was over, the researcher-instructor would ask the students in the treatment group to logout and return to the lecture theatre for a short de-briefing together with the whole class. If the web-conferencing session also coincided with one of the four standard lab-sessions, the researcher-instructor would go to one lab together with the students in the control group, while the students in the treatment group would go to another lab. Each one of the eight web-conferencing sessions was conducted according to this two-classroom model. All the students would see the same instructional contents regardless of whether they are

in the control or treatment group. A sample screen-print of a typical web-conferencing session is shown in Figure 4.

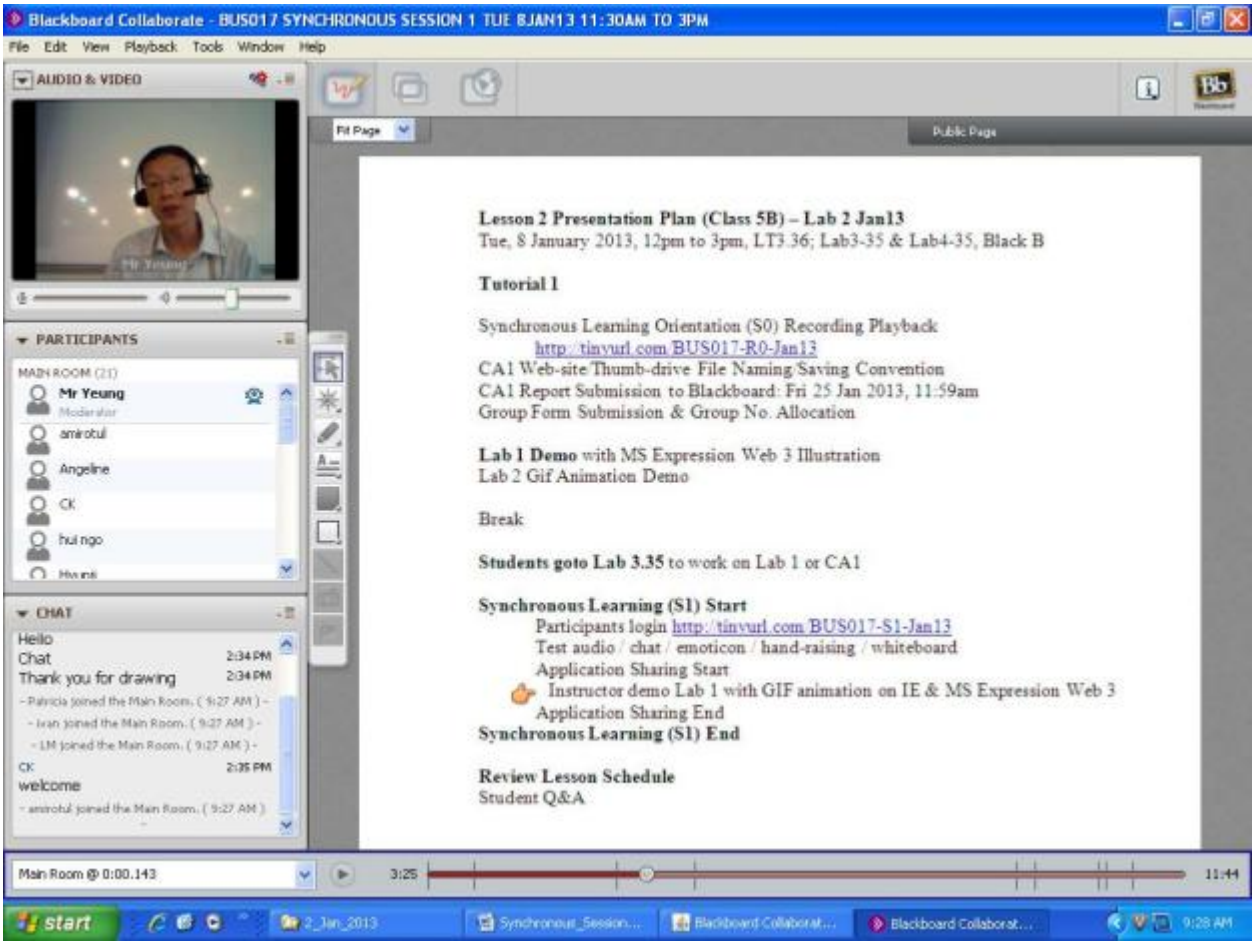

Figure 4: Instructional Contents of a Web-conferencing Session.

Course topics for web conferencing. During the October 2012 semester, the topics taught in web conferencing included topics 2, 4, 6, and 8 plus lab 4 (see course syllabus in Table 8), while topics 2 to 9 plus the four labs were taught in web conferencing for the January 2013 and April 2013 semesters, respectively. The difference in the coverage of topics between October 2012 and January 2013/April 2013 was due to the experience learned from action research. A detailed description of how one phase leads to another can be found in the sections

that cover the application of pedagogical action research (in Chapter 3) and the emergence of a pedagogical pattern (in Chapter 4) from this study.

Table 8

Course Syllabus of BUS017 Information Systems for Business

Topic	Description
Topic 1	Overview of Information Systems
Topic 2	Hardware – Inside the System Unit
Topic 3	Hardware – Input/Output and Storage Devices
Topic 4	Software – System, Utility and Application Software
Topic 5	Computer Networking Technology
Topic 6	The Internet, WWW, and e-Commerce
Topic 7	Ethical Use of Computers and Security in the Digital World
Topic 8	Database Management System
Topic 9	Systems Analysis and Design
Topic 10	Information Systems
Lab 1	Website Design: Basics
Lab 2	Website Design: Table with Frames
Lab 3	Website Design: Multimedia
Lab 4	Access 2007 Lab

Ethics. Student participation in the treatment group was totally voluntary. All students in the class were, initially, invited by the research assistant to participate in the study and that each student had the right to opt out from participating in web conferencing anytime during the semester without penalty. Students were informed about this study via (a) student information letter, and (b) in-class briefing. During the first lesson, the researcher-instructor welcomed all students to class and introduced the research assistant to them. Initially, it was planned that the research assistant would conduct the briefing but in reality this was not possible because the person lacked experience and confidence talking to a large crowd of students. Instead, an overview of the research study about web conferencing was explained to the class by the researcher-instructor. The students were also told about their freedom and rights to withdraw

from the study anytime during the semester and that the participation or non-participation of each student would remain confidential. Thereafter, the researcher-instructor left the classroom without interfering with the students on their decision of whether or not they would like to participate. The research assistant then distributed a hardcopy of the student information letter (see Appendix AC) with consent form (Appendix AD) to all students. For those students who were keen to participate, they would sign the consent form and return it to the research assistant who, in turn, would loan them USB headsets provided by UniSIM for this study. When this participant-invitation process was completed, the research assistant telephoned the researcher-instructor, who was waiting in his office, to return to class.

The research assistant was interviewed and appointed by the researcher-instructor. This person is not related to the researcher-instructor in any capacity in order to satisfy the neutrality and objectivity of the appointment. The research assistant was an undergraduate student studying in the University of London's Banking and Finance program at the Singapore Institute of Management (SIM). She was appointed on the basis of her previous experience assisting an economics professor in his research at SIM. The research assistant was paid an allowance of S$10 per hour, which included (a) attending meetings with the researcher-instructor, (b) administered student recruitment, (c) administered end-of-course surveys and interviews with the students.

As for the other classes in the BUS017 course (there were a total of five classes in October 2012, four in January 2013, and five in April 2013, respectively, inclusive of the class participating in this study), which did not take part in the investigation, the students and instructors were informed by the researcher-instructor about the study. Informing the instructors and students of the other BUS017 classes was necessary because they needed to know that the

class undertaking the study had eight lab sessions, four more than the standard lab sessions allocated by the Administration Department for each class. All the students in the class under study attended the same number of lessons, received identical course materials, worked on the same assignments, and completed the same examination so as to ensure that students in the control group as well as those from the other classes were not disadvantaged by not participating in web conferencing.

The above ethical considerations were consistent with Diener and Crandall's (1978) definition of informed consent whereby "the procedures in which individuals choose whether to participate in an investigation after being informed of facts that would be likely to influence their decisions" and are based on the four elements of competence, voluntarism, full information, and comprehension (pp. 52 - 53). Cohen el al. (2008) further pointed out that "if these four elements are present, researchers can be assured that subjects' rights will have been given appropriate consideration" (p. 53). Accordingly, approval for this study from the Research Ethics Board (REB) of Athabasca University was obtained for the period covering 1 September 2012 to 31 August 2013 (see Appendix AB). A separate ethics application was also made to UniSIM's Institutional Review Board (IRB) but that was deemed unnecessary in light of the approval already given by Athabasca University.

Feasibility. In a typical web conferencing session, the instructor or moderator would have a headset connected to a computer with the application running over the Internet. The physical location of the instructor is flexible because the only requirement is an Internet connection. Usually, the instructor would conduct the session from the office, at home, or in a hotel (if travelling). Similarly, the physical location of the students is also flexible. However, due to attendance requirements, participants in the treatment group were required to attend web

conferencing in a computer lab at UniSIM (The Singapore Immigration and Checkpoint Authority has a mandatory requirement that all foreign students fulfill 90% of attendance, while the UniSIM attendance requirement for local students is 75%). Given these attendance constraints, in order to make the study feasible, the researcher-instructor had to conduct the lesson from either the lecture theatre or the computer-lab. Students in the control group also attended the face-to-face lesson in either the lecture theatre or the computer-lab together with the researcher-instructor. Students in the treatment group went to the second computer-lab for web conferencing. The workflow for this two-classroom model is illustrated in Figure 5.

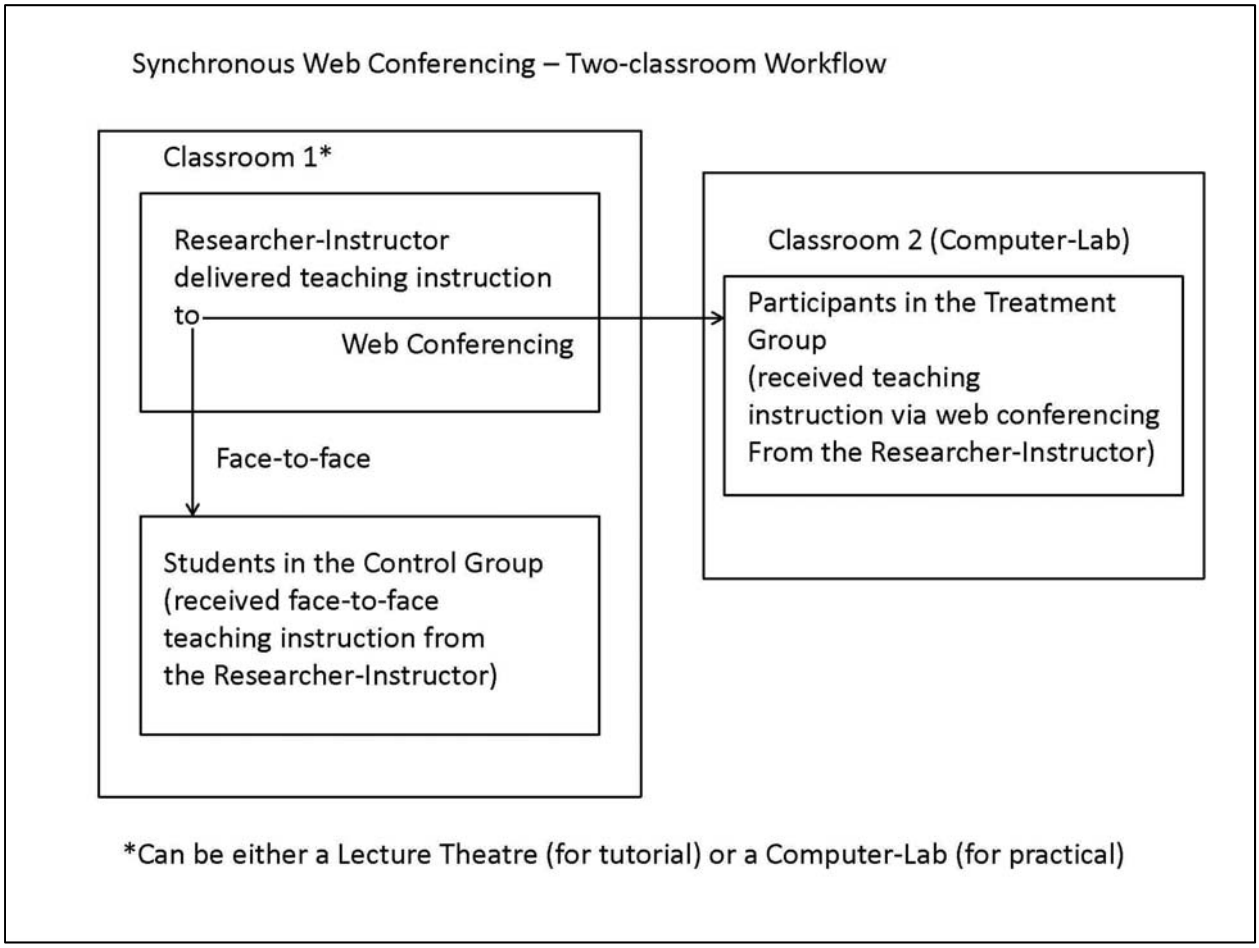

Figure 5: Synchronous Web Conferencing: Two-classroom Model.

The above two-classroom model of combining face-to-face teaching and web conferencing together ensured that all students' learning needs were met.

Other Practical Issues. Each student-participant in the treatment group received a USB headset on loan from the school for the duration of the semester. As USB headsets were more expensive compared to non-USB ones, it was not economically feasible to give the headsets to participating students free of charge, as originally recommended by UniSIM's Centre for Applied Research (CFAR) Committee, which approved the funding for this study. Given that only USB headsets were compatible with the lab-based computers, each headset was cleaned before it was re-issued to the students in the beginning of each semester.

A second problem concerned with the purchasing of software license from Blackboard, which encountered both internal and external difficulties. Internally, the UniSIM department responsible for purchasing software for e-learning activities is the Educational Technology and Production (ETP) department. Prior to 1 January 2013, this department had bought licenses for the WebEx system but this software was rarely used by the UniSIM faculty. Externally, Elluminate had been bought over by Blackboard in July 2010 (Elluminate, 2010). In order to overcome these internal and external problems, approval was given by the CFAR Committee to treat this study as an independent project, separate from the ETP budget. This arrangement enabled direct negotiation between the researcher-instructor and Blackboard to obtain the software license for this study.

Asynchronous element of the study. While this study was about the synchronous aspects of web conferencing, there is also the asynchronous element in the form of lesson recordings provided by the Blackboard Collaborate™ system. Given that this is an important

feature of web conferencing, participants in the treatment groups were given access to the recordings as part of the study.

Pilot testing. Prior to the start of the study, a series of test sessions took place during the April 2012 semester (Phase 0) to examine the various ethical, feasibility, and practical issues as mentioned above. In order for the testing to commence in the April 2012 semester, the web-conferencing software license needed to be negotiated with Blackboard and USB headsets had to be purchased. For the web-conferencing system, an initial one-year, 500-user license was activated on 7 September 2011 by Blackboard covering the period from 1 September 2011 to 31 August 2012, to be followed by a second-year extension (1 September 2012 to 31 August 2013). For the USB headsets, 100 units were purchased and delivered to UniSIM by mid-September 2011.

A problem associated with software versioning was encountered during the pilot testing in that the Blackboard web-conferencing system would, by default, create sessions in version 11 (Collaborate), which provided a totally different user-interface from version 10 (Elluminate). This problem was resolved by changing the default setting to version 10. It should be pointed out that at the time of the pilot test the researcher-instructor was more familiar with Elluminate because of his experience in using the system as a doctoral student with Athabasca University. As a result, Elluminate (v10) was used during pilot testing but a switch-over to Collaborate (v11) was made for the October 2012 semester when the actual study began.

Although Elluminate and USB headsets had been tested for compatibility in different lecture theatres and in the labs, a network-access problem prevented the upload of Powerpoint (PPT) files to Elluminate on the instructor's computer in the lecture theatre. This problem was resolved by first uploading the PPT file to Elluminate on a desktop computer not connected to

the lecture-theatre network, and then saving it as a Whiteboard (WBD) file. The WBD file, which contained the PPT file, could then be opened in Elluminate on the lecture-theatre computer.

Several web-conferencing sessions were tested and both versions of the system: Collaborate (v11) and Elluminate (v10), worked well in UniSIM's network environment. However, another system setting that needed to be changed in order to make the sessions more authentic was the name of the moderator. By default, it was displayed as "SIM University," which appeared as rather impersonal. A new moderator-account, "Mr Yeung," with whom the participating students could relate, was created and used for the actual study.

Timelines. A Gantt chart outlining the study's planned activities and milestones is shown in Appendix D.

Part 2: Research Methodology

The discussion on research methodology aims to: (a) clarify the meaning of educational research; and (b) provide a set of definitions for the following terms: *paradigm*, *methodology*, and *methods,* and to delineate their relationship in educational research. The major branches of research paradigms and their associated methodology and methods are also outlined with the aim of identifying a suitable paradigm and methodology for this study.

Burns (1997) described research as a systematic investigation or inquiry involving the collection, analysis, and interpretation of data in order "to discover truth" and "uncover knowledge" (as cited in Cohen et al., 2008, pp. 6-7). In the context of education and psychology, such an investigation aims to "understand, describe, predict or control an educational or psychological phenomenon or to empower individuals in such contexts" (Mertens, 2005, p. 2). There are different ways to uncover knowledge about an educational phenomenon according to a

particular “paradigm” or “knowledge claim” (Creswell, 2003), which is defined as “the theoretical framework” that “influences the way knowledge is studied and interpreted” (Mackenzie & Knipe, 2006, p. 195) or “a loose collection of logically related assumptions, concepts, or propositions that orient thinking and research” (Bogdan & Biklen, 1998, p. 22).

With the understanding that “paradigm” is the theoretical framework that influences research, it follows that “methodology” is “the overall approach to research linked to the paradigm or theoretical framework,” whereas “methods” refer “to systematic modes, procedures or tools used for collection and analysis of data” (Mackenzie & Knipe, 2006, p. 199). From these definitions, a mapping between the theoretical framework, research approach, and procedures or tools for data collection and analysis is formed among paradigm, methodology, and methods, respectively, in educational research.

While the various theoretical paradigms “discussed in the literature such as: positivist (and postpositivist), constructivist, interpretivist, transformative, emancipator, critical, pragmatism, and deconstructivist” can lead “to confusion for the first time researcher” (Mackenzie & Knipe, 2006, p. 195), they essentially can be categorized into four common paradigms: (a) positivist/postpositivist, (b) interpretivist/constructivist, (c) transformative, and (d) pragmatic. A brief description of each of these four paradigms is summarized in Table 9.

Table 9

Research Paradigm

Paradigm	Description
Positivist/Postpositivist	Refers to as the "scientific method or science research" (Mackenzie & Knipe, 2006, p. 195); "the knowledge that develops through a postpositivist lens is based on careful observation and measurement of the objective reality … numeric measures of observations and studying the behavior of individuals become paramount for a postpositivist" (Creswell, 2003, p. 7).
Interpretivist/Constructivist	Views research with the intention of understanding "the world of human experience" (Cohen & Manion, 1994, p. 36); "reality is socially constructed" (Mertens, 2005, p. 12); tends to rely upon the "participants' views of the situation being studied" (Creswell, 2003, p. 8).
Transformative	Believes that "inquiry needs to be intertwined with politics and a political agenda" and contains an action agenda for reform "that may change the lives of the participants, the institutions in which individuals work or live, and the researcher's life" (Creswell, 2003, pp. 9-10).
Pragmatic	Focuses on the "what" and "how" of the research problem and places "the research problem" as central to the study and applies all approaches to understanding the problem (Creswell, 2003, p. 11); "rejected the scientific notion that social inquiry was able to access the 'truth' about the real world solely by virtue of a single scientific method' (Mertens, 2005, p. 26); "no philosophical loyalty" to other paradigms (Mackenzie & Knipe, 2006, p. 197).

Within the major research paradigms outlined, the methodology and methods associated with each paradigm, according to Mackenzie and Knipe (2006), are summarized in Table 10.

Table 10

Research Paradigm, Methodology, and Methods

Paradigm	Methodology	Methods
Positivist/Postpositivist	Quantitative	Experiment, quasi-experiments, tests, surveys
Interpretivist/Constructivist	Qualitative	Interviews, observations, document reviews, visual data analysis
Transformative	Quantitative & Qualitative (Mixed Methods)	Quantitative and qualitative methods of data collection and analysis
Pragmatic	Quantitative & Qualitative (Mixed Methods) that match the specific questions and purpose of the research.	Quantitative and qualitative methods of data collection and analysis

Note. Adapted from "Research Dilemmas: Paradigms, Methods and Methodology," by N. Mackenzie, and S. Knipe, 2006, *Issues in Educational Research, 16*(2), pp. 193 – 205.

The Case for Mixed Methods Research

The methodology adopted to investigate web conferencing was based on a combination of quantitative and qualitative approaches in order to provide a comprehensive examination of the research problem. The research methodology that combines both approaches is known as mixed or combined methods research (Spicer, 2004). According to Johnson and Onwuegbuzie (2004), mixed methods research is " the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study" (p. 17). It is considered as one of the three major methodologies of research along with qualitative and quantitative methodologies (Johnson, Onwuegbuzie, & Turner, 2007) and it provides a broader approach to problem-investigation rather than viewing it solely from either a qualitative or quantitative perspective. Pragmatism (Creswell, 2003; Mertens, 2005; Mackenzie & Knipe, 2006) is often associated with mixed methods research in

that, while it does not provide the perfect solution, the mixing of different methods should "offer the best opportunities for answering important research questions" (Johnson & Onwuegbuzie, 2004, p. 16).

The Case for Action Research

Given the nature of the research problem, a mixed methods approach was considered to provide a more viable option than the quantitative or the qualitative approach alone. Moreover, it offered the flexibility and pragmatism that were especially needed for a study on pedagogy. It followed that under the transformative paradigm (Mackenzie & Knipe, 2006), the methodology of action research (Lewin, 1946), and, specifically, pedagogical action research (Norton, 2009), were examined in relation to the research questions on pedagogy. Action research is often associated with the participatory or emancipatory paradigm (Creswell, 2009; Cohen et al., 2007); furthermore, according to Mackenzie and Knipe (2006), both "participatory" and "emancipatory" are terms that are also associated with the transformative paradigm. In terms of its characteristics, action research is "practical problem-solving" and "methodologically eclectic" (Cohen et al., 2008, p. 299,) and the adoption of Norton's (2009) pedagogical action research for this study was based on practical and problem-centered considerations rather than an alignment with a particular paradigm. Shattuck (2011), in comparing with design-based research (DBR), summed up action research as "the teacher-as-researcher…..emphasis is on reflective research to inform individual practice at the local level. DBR, in contrast, is always collaborative, usually with teams of researchers, designers, and instructors working together" (p. 24).

Research Design

Within the teaching context of UniSIM, the design of the study needed to be aligned with the research questions and, accordingly, the first question on students' learning achievement:

- In the context of SIM University, what are the differences in student achievement between students experiencing synchronous web-conference instruction and those experiencing traditional classroom-based instruction?

Quasi-experimental design. To address this question, an experimental design in the form of a quasi-experiment was adopted. According to Cohen et al. (2008), a quasi-experiment could take one of the following forms:

- Pre-experimental design: the one group pretest-post-test design;
- Pre-experimental design: the one group *post-tests only* design;
- Pre-experimental design: the *post-tests only* non-equivalent design;
- Pretest-post-test non-equivalent group design;
- One-group time series.

This study adopted a quasi-experimental based on *the* pretest-*post-test only non-equivalent group design* and it is represented by the symbols as shown in Figure 6:

Experimental	RO_1	*X*	O_2
Control	RO_3		O_4

Figure 6. Symbolic Representation of a Quasi-experiment. Adapted from *Experimental and Quasi-experimental Designs for Research on Teaching*, by D. T. Campbell, and J. C. Stanley, 1963, Boston, MA: Houghton Mifflin. Reprinted with permission.

According to Cohen et al. (2008), the addition of a control group made this design "a decided improvement over the one group pretest-post-test design" (p. 283). The above representation is based on the following convention as defined by Campbell and Stanley (1963):

- *X* represents the exposure of a group to an experimental variable or event, the effects of which are to be measured;
- O refers to the process of observation or measurement;
- R indicates random assignment to separate treatment groups;
- Parallel rows un-separated by dashes represent comparison groups equated by randomization, while those separated by a dashed line represent groups not equated by random assignment.

In the context of this study, the "pretest-post-test only non-equivalent group design" quasi-experiment was based on the creation of a treatment group and a control group. The treatment group comprised students from a class taking the DMS/BUS017 course, while the control group was made up of all other students from the same class. Students in the treatment group received online instruction in the lab via web conferencing, while those in the control group received face-to-face instruction in the lecture theatre. The researcher-instructor was physically present in the lecture theatre with students from the control group and delivered instruction to both groups simultaneously.

Among a class of students taking the Information Systems for Business (BUS017) course, all were initially invited to participate in the study on a voluntary basis by the Research Assistant. Among the students who agreed to participate voluntarily in the study, it was planned that 50% of the class-size would be randomly assigned to the treatment group by the Research Assistant with the remaining 50% to the control group. With a class-size of between 60 to 80

students, it was expected that the treatment group and the control group would comprise between 30 to 40 students, respectively. However, the number of participants was less than 50% due to the voluntary nature of the study (despite the Research Assistant's best attempts not everyone was willing to participate). As a result, no random assignment took place, and all students who agreed to participate were instead allocated into the treatment group while those who did not agree to participate in the study were classified under the control group. With three cycles of quasi experiments conducted over three semesters commencing on 1 October 2012, 1 January 2013, and 1 April 2013, respectively, it followed that three treatment groups (T_1, T_2, & T_3) and three control groups (C_1, C_2, & C_3) were created, respectively. According to Campbell and Stanley's (1963) convention, each pair of treatment-control group was represented as a quasi-experiment, without random assignment, according to the representation as shown in Figure 7.

$Treatment_1$	O_1 X O_2		
$Control_1$	O_3 O_4		
$Treatment_2$		O_5 X O_6	
$Control_2$		O_7 O_8	
$Treatment_3$			O_9 X O_{10}
$Control_3$			O_{11} O_{12}

Figure 7. Quasi-experimental Design. Adapted from *Experimental and Quasi-experimental Designs for Research on Teaching*, by D. T. Campbell, and J. C. Stanley, 1963, Boston, MA: Houghton Mifflin. Reprinted with permission.

Pretest. As a result of the low participation rate, the random assignment of students did not take place. Instead, all students who volunteered to attend lessons in web conferencing were allocated into the treatment group in October 2012, January 2013, and April 2013, respectively. Without random assignment, a pretest was conducted in January 2013 and April 2013, respectively, to determine whether those students in the treatment group were academically

comparable with their counterparts in the control group. The pretest comprised a set of 10 multiple choice questions that covered the BUS017 course syllabus based on actual past examination questions. They were printed on two sets of colored papers: green and white. The green question papers were distributed to students in the treatment group to work on in a lesson at the beginning of the semester before the start of web conferencing. Similarly, the white question papers were handed out to students in the control group to work on during the same lesson. The pretest question papers for January 2013 and April 2013 are shown in Appendices AH and AI, respectively. Results of the two pretests were compiled (see Figures 8 and 9) with t-tests conducted for January 2013 and April 2013, respectively. As shown in Tables 11 and 12, there was no significant difference in the mean scores between treatment (M=6.95, SD=1.14) and control (M=6.45, SD=1.60); t (40) = -1.14, p = 0.26, for January 2013; and between treatment (M=5.82, SD=1.13) and control (M=6.35, SD=1.57); t (41) = 1.18, p = 0.24, for April 2013, respectively. These results suggest that the two groups of students were comparable in both semesters.

Table 11

T-Test of Mean Pretest Scores for Treatment and Control (January 2013)

		t-test for Equality of Means			
		t	df	Sig. (2-tailed)	Mean Difference
PretestScore	Equal variances assumed	-1.145	40	.259	-.49545
	Equal variances not assumed	-1.163	38.053	.252	-.49545

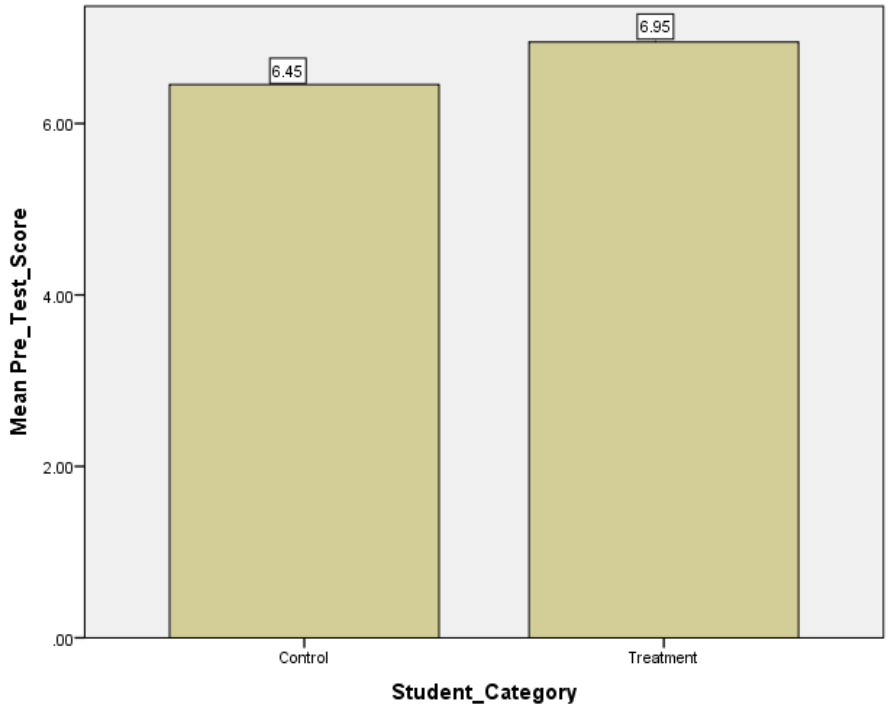

Figure 8. Mean Pretest Scores for Treatment and Control (January 2013)

Table 12

T-Test of Mean Pretest Scores for Treatment and Control (April 2013)

		t-test for Equality of Means			
		t	df	Sig. (2-tailed)	Mean Difference
PretestScore	Equal variances assumed	1.182	41	.244	.52262
	Equal variances not assumed	1.266	40.552	.213	.52262

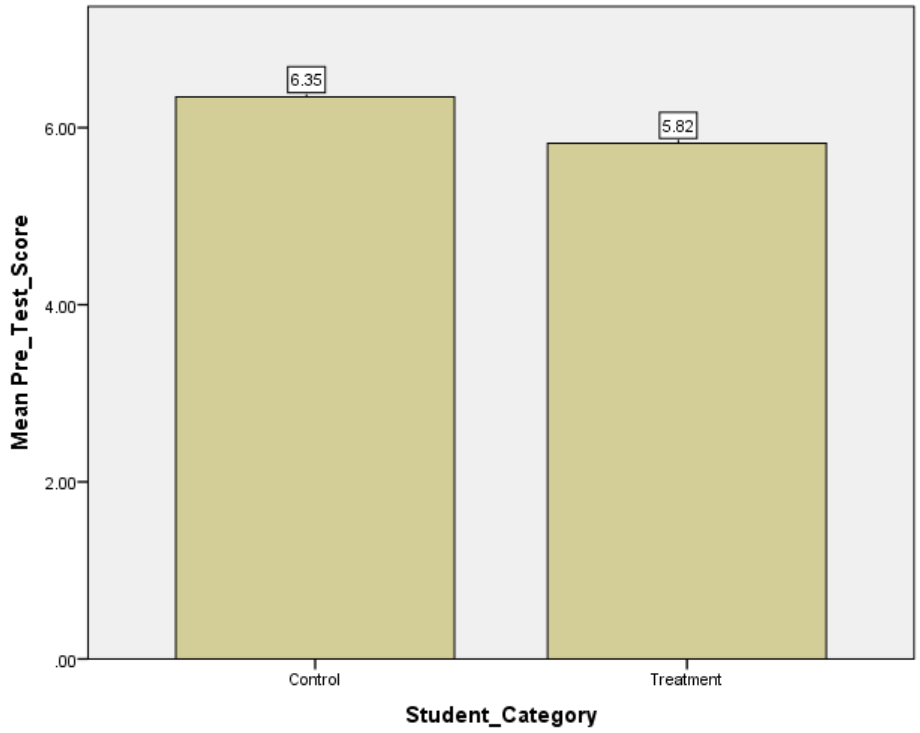

Figure 9. Mean Pretest Scores for Treatment and Control (April 2013)

Regarding the second research question on class-size:

- How does class-size affect student achievement within a synchronous web-conference environment?

It was decided to vary the size of the treatment and control groups. The original plan was to decrease the third semester's (April 2013) sample size to 20% for the control group (C_3) and to increase the treatment group (T_3) to 80%. However, this arrangement was modified due to difficulties in recruiting the required number of participants. Instead, the sample size of T_3 and C_3 stood at 39% and 61% respectively.

Instrumentation. Both surveys and semi-structure interviews were used in each of the three semesters covered by this study. Their purpose was to investigate the following research questions on student learning experience and pedagogy:

- What aspects of synchronous web-conference learning would enhance students' learning experience?
- What are the features of an effective pedagogical model that can be adopted in a synchronous web-conference context?

The end-of-course survey was constructed based on a 7-point Likert scale for capturing students' learning experience and a range of other issues relating to web conferencing. They included questions about (a) ease of use, (b) interaction, (c) audio, (d) application sharing, (e) duration, (f) frequency, (g) network speed, (h) recording, and (i) instructor appearance on video. In addition, there was a question that asked students to rate their overall learning experience. The survey questionnaire, in print-format, was administered by the research assistant without the presence of the researcher-instructor during the final lesson of the semester. The end-of-course survey is shown in Appendix E.

The semi-structure interview comprised 13 questions designed to seek students' views on the learning that they experienced with web conferencing. The questions asked students to comment on a range of issues including (a) whether they preferred face-to-face learning over web conferencing, (b) which aspects of web conferencing that they liked best/worst, (c) why they disliked web conferencing, (d) the researcher-instructor's teaching style, (e) the kinds of lesson delivery that they found helpful, (f) the course topics suitable for web conferencing, (g) discussion opportunities, and (h) use of video by the researcher-instructor. Initially it was planned that each student selected for interview would either meet with the research assistant face-to-face or by telephone at the end of the semester. However, this was not possible in reality because the foreign students left Singapore to return to their home country as soon as the semester had ended, while the local students were occupied by their vacation-employment

priorities. The high cost of international mobile calls with the foreign students made the telephone option infeasible. Eventually it was decided that the interview questionnaire would be administered by the research assistant who communicated with each student via e-mail. The interview questionnaire is shown in Appendix F.

Data Collection. For the question on student learning achievement, end-of-course examination results for each of the three semesters were collected and comparisons made between treatment and control over the three semesters. Similarly, for the question on class-size, end-of-course examination results were compared between T_3 and T_1, and T_3 and T_2, respectively. Also, for the question on learning experience, surveys were administered by the research assistant at the end of each semester for participants in the treatment group in order to determine their learning experience of web conferencing.

The fourth question, in relation to pedagogy, asked:

- What are the features of an effective pedagogical model that can be adopted in a synchronous web-conference context?

According to Mishra and Koehler (2006), pedagogy is about "the process and practice or methods of teaching and learning" (p. 1025). An investigation on pedagogy would entail analyzing the course content and learning activities, including course assignments provided to the treatment group (T) via web conferencing and examining the student-participants' learning process. The data collected came in the form of descriptive answers provided by selected students to the interview questions and a content analysis was used to analyze the qualitative data, separately, in each of the three semesters. The learning-technology-by-design approach of

the technological pedagogical content knowledge (TPCK) framework (Mishra & Koehler, 2006) provided the basis for the pedagogical developments in connection with this question.

Data validation. An external peer-debriefer was invited to validate the instructional aspects of the data collected for this study. This person is well qualified for this role because of his vast experience in implementing web-conferencing teaching and learning practices at his university (Rowe & Ellis, 2010). The peer-debriefer played the role of "devil's advocate" by asking the researcher "questions about the research study, [comparing] the analyzed data with the raw data, and [examining] the data analysis in relation to the research questions" (Ware, Ohrt, & Swank, 2012, p. 143). The strategy of involving a peer-debriefer to validate the data is consistent with the advice of Creswell (2007) in that having an external person adds to the clarity, confidence, and rigor to the research study. In addition, reflective journals were written by the researcher-instructor for each lesson that involved web conferencing and, together with the peer-debrief feedback, this collection of information is discussed in Chapter 4. The researcher-instructor's reflective journals are shown from Appendix S1 to U6, while the peer-debrief transcripts are available from Appendix V1 to V6.

Potential bias. The Hawthorne Effect is one area of potential bias that could affect the neutrality of this study. This phenomenon originates from a study on industrial management at the Hawthorne plant of the Western Electric Company in Chicago, Illinois, USA (Wickström & Bendix, 2000). The Mosby Medical Dictionary defines the Hawthorne Effect as "a general unintentional, usually beneficial, effect on a person, a group of people … being studied. It is the effect of an encounter … with an investigator or health care provider … [and] likely to confound the results of a study or investigation." In the context of this study, bias could have occurred in that the participants may have adjusted their behaviors towards learning in the BUS017 course

because they knew that they were taking part in a study. Students in the control group also knew about the study and as such they could also be susceptible to the Hawthorne Effect. While it was not possible to provide placebos to the control group as in the case of a medical experiment in order to minimize the Hawthorne Effect, ensuring that both groups of participants were provided with identical learning contents and activities would, to some extent, reduce the impact of this phenomenon in educational research.

Other potential bias that should be minimized, according to Cohen et al. (2008), include reactivity effects (i.e., that the participants would behave differently when subjected to scrutiny), participant dropout rates, uneven matching between control and treatment groups, and other situational factors such as environment, noise, and distraction. There were no participant "dropouts" other than non-lesson attendance by some students, a situation that is normal in any universities for both face-to-face and online courses.

In addition, the researcher-as-instructor aspect of this study was another source of bias that needed to be recognized and acknowledged as an unavoidable constraint. This potential bias was addressed by the presence of a research assistant who acted like a "quasi-researcher" by communicating directly with the students without the interference of the researcher-instructor on matters such as explaining to the students about the research study, and administering surveys and interviews. Given the situational context, it was not possible to seek a third-party instructor to conduct this kind of dual-mode teaching via a web-conferencing system because, at the time of this study, no one at UniSIM had experience in using web conferencing for teaching. Rather than perceiving it with reservation, it should be viewed as a unique opportunity to undertake this kind of research study because it was different from the traditional "observational" studies conducted in education given that the presence of the researcher-as-instructor is also a valid

element of the action research paradigm. Moreover, its ethical position was justified with approval from Athabasca University's Research Ethics Board (see Appendix AB).

Pedagogical Action Research

In relation to the question on pedagogy:

- What are the features of an effective pedagogical model that can be adopted in a synchronous web-conference context?

The methodology of pedagogical action research (PAR) was adopted due to the teaching-practice nature of this study as it was designed to "systematically investigate one's own teaching/learning facilitation practice, with the dual aim of improving that practice and contributing to theoretical knowledge in order to benefit student learning" (Norton, 2009, p. 59).

As discussed in Chapter 2, pedagogical action research is a methodology that has two distinct purposes: to improve educational practice and to bring about social change. From an educational standpoint, Cohen et al. (2008) pointed out that action research "can be undertaken by the individual teacher … in a variety of areas, for example, teaching methods: replacing a traditional method by a discovery method" (p. 297). The various definitions of action research all point to the themes of "action" and "research" for which Norton (2009) offered the following definitions:

- *action* - "change resulting from the research … from a personal reflective insight as a teacher, to making small changes to the courses you are responsible for … to challenging discipline conventions"

- *research* - "not just systematic collection, interpretation and dissemination of one's findings, but also systematically studying action research principles" (p. 59).

Application of pedagogical action research. Norton's (2009) cyclical, five-step ITDEM model was adopted in this study to investigate pedagogy with an emphasis on student learning experience. Accordingly, it was put into practice over three semesters starting from the October 2012 semester. The pedagogical issues are summarized in Table 13.

Table 13

Application of the ITDEM Model

The ITDEM Model	Application
1. Identifying a problem/paradox/ issue/difficulty (I)	Lectures and tutorials taught in face-to-face mode in the classroom lacked student participation; students learned practical in two labs. Each topic taught in the lecture was followed by a tutorial. Problems: (1) lacked of student participation, and (2) the two-lab problem.
2. Thinking of ways to tackle the problem (T)	Through observing the DMS students' learning styles over the several semesters since October 2009, the problem of a lack of student participation in class was largely due to a combination of peer pressure and distraction. If students' attention could be directed back to the curriculum with more engagement, then they should be participating more actively in the tutorial activities. Delivering the lessons via web conferencing could be one way to arouse the students' learning curiosity and attention. It also solved the two-lab problem.
3. Doing it (D)	Web conferencing was introduced in the October 2012, January 2013, and April 2013 semesters, respectively. In the October 2012 semester (Phase 1), seven web-conferencing sessions were conducted for part of the lesson on topics 2, 4 & 6 plus one lab-session on database design (see Table 8 above for the course syllabus discussed in part 1 of this chapter).
4. Evaluating it (actual research findings) (E)	Although the web-conferencing sessions went well, they made no difference in terms of student engagement when they were used for lecturing.
5. Modifying future practice (M)	In the January 2013 semester (Phase 2), one web-conferencing session was conducted for part of a lecture with tutorial on topic 2, four sessions on tutorial activities with discussions on past examination questions for topics 3 to 9 plus three sessions for lab activities. However, students' learning experience was hampered by severe network problems encountered during this semester. For April 2013 (Phase 3), all eight web-conferencing sessions were conducted for tutorials and labs similar to Phase 2 plus examination briefing.

In addition to the above pedagogical action research undertaken, data gathered from student surveys and interviews were analyzed in relation to students' learning experience in web conferencing, while observations made by the researcher-instructor were also documented in reflective journals. Further discussions on pedagogy can be found in Chapters 4 and 5.

Cross-sectional Study

In relation to the research questions on learning achievement and class-size between three classes of students who learned with web-conferencing or face-to-face instruction in the BUS017 course over three semesters (October 2012, January 2013 and April 2013), a cross-sectional study was undertaken (Cohen et al., 2008). The rationale for doing a cross-sectional study was, apart from being compatible with the adopted quasi-experimental design (the pretest-post-tests non-equivalent group design) (Campbell & Stanley, 1963), "different respondents are studied at different points in time" (Cohen et al, 2008, p. 212) and that a cross-sectional study "enables different groups to be compared" (p. 220) over time.

Summary

The first part of this chapter described the procedures of the study including: (a) teaching context, (b) web-conferencing setup, (c) course topics for web conferencing, (d) ethics, (e) feasibility, (f) other practical issues, (g) asynchronous element of this study, (h) pilot testing, and (i) timelines. In the second part, methodology and paradigm were discussed. In particular, the transformative/pragmatic research paradigm of mixed methods research in a participatory action research framework was adopted. Specifically, a cross-sectional study (Cohen et al., 2008) combined with quasi-experiments of the type "post-tests only non-equivalent group design" (Campbell & Stanley, 1963) were used to investigate the research questions relating to learning

achievement and class-size. Regarding the question on student learning experience, it was informed by data from student surveys and interviews, while the question on pedagogy was investigated by Norton's (2009) pedagogical action research as well as by reviewing the data provided by student interviews and the researcher-instructor's reflective journals. The subsequent chapters of this dissertation will cover data analysis, results and discussion, and conclusions.

Chapter IV – DATA ANALYSIS

This chapter reports on the data obtained from investigating web conferencing with three classes of students taking the DMS Information Systems for Business (BUS017) course, over a period of nine months, in the semesters of October 2012, January 2013, and April 2013, respectively. It is divided into two parts with Part 1 focusing on reporting the results of the quantitative data while Part 2 will report and discuss the qualitative data. Quantitative data in the form of student end-of-course examination results and survey data were statistically analyzed while qualitative data provided by student interviews and the researcher-instructor's reflective journals were separately analyzed using content analyses.

Part 1: Quantitative Data Analysis

A quantitative analysis of the totality of the data was initially conducted through a two-way analysis of variance (ANOVA) to determine if there was any overall difference in student achievement between the treatment group and the control group, while a Chi-squared ($\chi.^2$) test of independence was also carried out between the two groups. Thereafter, further quantitative analyses at the semester level were performed to answer the individual research questions. Starting with a "big picture" approach first before working down to analyze the data in each of the three semesters separately was adopted as the strategy for conducting the quantitative data analyses in this study.

Two-way ANOVA. The following research hypotheses were tested:

Test 1

- HO: there was no difference in the mean examination score between students receiving instruction via web conferencing (treatment group) and those receiving face-to-face instruction (control group)

- H1: the mean examination score between treatment and control was different

Test 2

- HO: there was no difference in the mean examination score between the three semesters (Oct2012, Jan2013, Apr2013)
- H1: the mean examination score between the three semesters was different

Test 3

- HO: there was no interaction between the factors (Student Group versus Semester)
- H1: there was interaction between the factors (Student Group versus Semester)

The results are shown in Table 14.

Table 14

Two-way ANOVA of Students' Final Examination Scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Model	821006.480[a]	6	136834.413	995.159	.000
Student_Group	610.111	1	610.111	4.437	.037
Semester	1241.006	2	620.503	4.513	.012
Student_Group * Semester	654.296	2	327.148	2.379	.096
Error	24337.520	177	137.500		
Total	845344.000	183			

a. R Squared = .971 (Adjusted R Squared = .970)

According to Table 14, students' final examination scores were subjected to a two-way ANOVA for the two groups of students (treatment and control) and over three semesters of study (Oct2012, Jan2013, Apr2013). Both main effects were statistically significant at the .05 significance level. The main effect of student groups yielded an F ratio of $F(1, 177) = 4.4$, $p = 0.04 < 0.05$, indicating that the mean examination score was significant in that the treatment group ($M = 68.9$, $SD = 11.8$) was higher than the control group ($M = 65.4$, $SD = 12.2$) (see Figure 10). The main effect of semester yielded an F ratio of $F(2, 177) = 4.5$, $p = 0.01 < 0.05$, indicating that the mean examination score was significant in that the October 2012 semester ($M = 69.1$, $SD = 9.9$) was higher than the January 2013 semester ($M = 63.4$, $SD = 13.4$) and the April 2013 semester ($M = 68.1$, $SD = 12.3$), respectively (see Figure 11). The interaction effect was non-significant, $F(2, 177) = 2.38$, $p = 0.096 > 0.05$. Figure 10 shows students' mean examination score by student group, while Figure 11 shows students' mean examination score by semester.

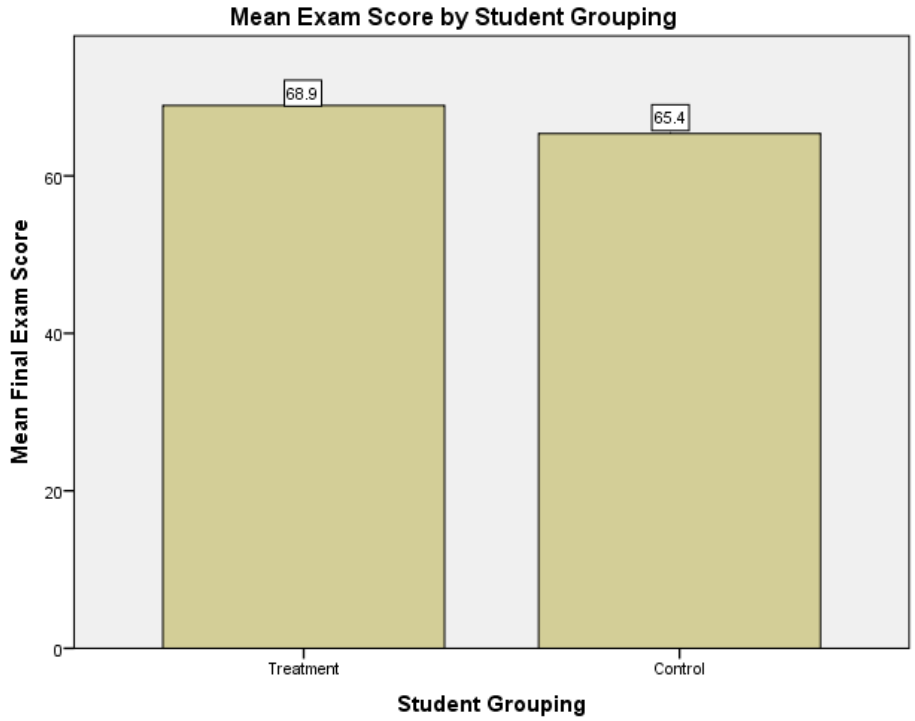

Figure 10: Mean Examination Score by Student Group

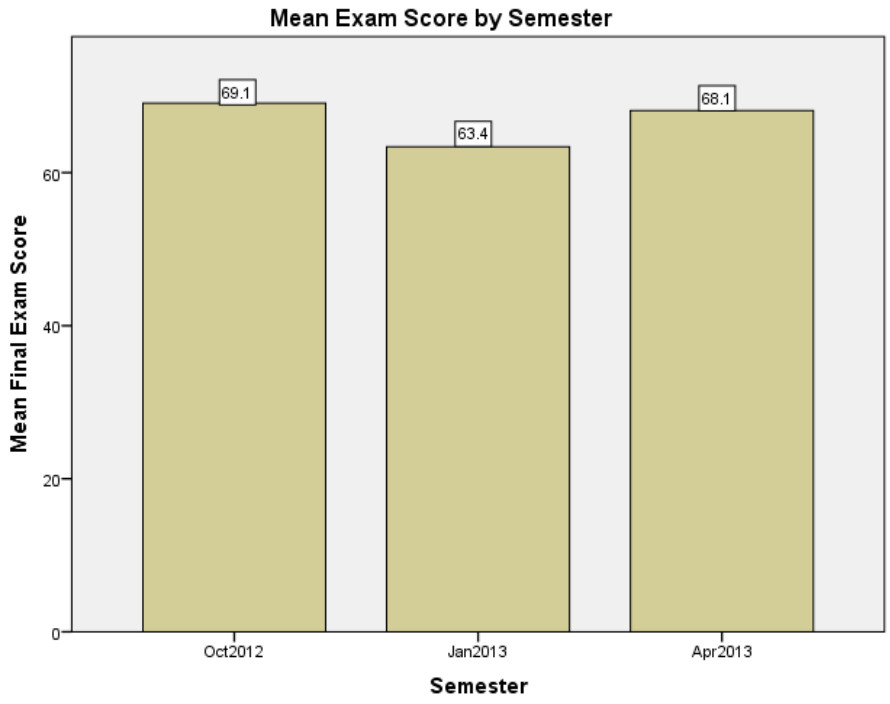

Figure 11: Mean Examination Score by Semester

Chi-squared ($\chi.^2$) test of independence. The following research hypothesis was tested:

- HO: there is no relationship in student achievement (overall) between students receiving web-conferencing instruction and students receiving face-to-face instruction
- H1: there is a relationship in student achievement (overall) between students receiving web-conferencing instruction and students receiving face-to-face instruction

As can be seen by the frequency cross-tabulated in Table 15, there is no relationship in the overall student achievement between students who received instruction via synchronous web conferencing (Treatment) and those who received face-to-face instruction (Control) over the three semesters (October 2012, January 2013, and April 2013), χ^2 (1, N=183) = 0.00, p = 0.99 > 0.05. The sample included 78 students (of which 75 passed the course and 3 failed) who received instruction via synchronous web conferencing and 105 students (of which 101 passed the course and 4 failed) who received face-to-face instruction over the three semesters.

Table 15

Chi-squared Test of Independence between Treatment and Control

	Observed Frequencies		
	Student Group		
Student Achievement	Treatment	Control	Total
Pass	75	101	176
Fail	3	4	7
Total	78	105	183

Analyses of Data at Semester Level

At the semester level, each research question was answered by analyzing the quantitative data for October 2012, January 2013, and April 2013, respectively.

Research Question on Student Achievement

With reference to the question on student achievement:

- In the context of SIM University, what are the differences in student achievement between students experiencing synchronous web-conference instruction and those experiencing traditional classroom-based instruction?

Individual t-tests were conducted to determine if there was a difference in the mean examination scores for treatment and control groups in the semesters of October 2012, January 2013, and April 2013, respectively, according to the following research hypothesis:

- H0: there is no difference in the mean examination scores between treatment and control groups
- H1: the mean examination scores between treatment and control groups are not the same

October 2012. As shown in Tables 16 and 17, there was no significant difference in the mean examination scores between treatment (M=69.4, SD=9.70) and control (M=68.8 SD= 10.22); t (64) = -0.23 p = 0.82 > 0.05. These results suggest that there was no significant difference in student achievement for students who received instruction in web conferencing (treatment) compared with those who received face-to-face instruction (control) in the October 2012 semester.

Table 16

Mean Examination Scores for October 2012

	Student_Grouping	N	Mean	Std. Deviation
Final Examination Scores for October 2012	Control	35	68.8286	10.22248
	Treatment	31	69.3871	9.69769

Table 17

T-test of Mean Examination Scores for October 2012

		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
Final Examination Scores for October 2012	Equal variances assumed	-.227	64	.821
	Equal variances not assumed	-.228	63.682	.821

January 2013. According to Tables 18 and 19, there was no significant difference in the mean examination scores between treatment (M=64.1, SD=11.1) and control (M=62.8, SD= 15.0); t (59) = -0.38, p = 0.71 > 0.05. These results suggest that there was no significant difference in student achievement for students who received instruction in web conferencing (treatment) compared with those who received face-to-face instruction (control) in the January 2013 semester.

Table 18

Mean Examination Scores for January 2013

	Student_Grouping	N	Mean	Std. Deviation
Final Examination Scores for January 2013	Control	36	62.8333	14.99047
	Treatment	25	64.1600	11.09685

Table 19

T-test of Mean Examination Scores for January 2013

		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
Final Examination Scores for January 2013	Equal variances assumed	-.376	59	.708
	Equal variances not assumed	-.397	58.714	.693

April 2013. As shown in Tables 20 and 21, there was a significant difference in the mean examination scores between treatment (M=73.7, SD=13.5) and control (M=64.5, SD= 10.0); t (54) = -2.94, p = 0.01 < 0.05. These results suggest that there was significant difference in student achievement for students who received instruction in web conferencing (treatment) compared with those who received face-to-face instruction (control) in the April 2013 semester.

Table 20

Mean Examination Scores for April 2013

	Student_Grouping	N	Mean	Std. Deviation
Final Examination Scores for April 2013	Control	34	64.4706	10.01585
	Treatment	22	73.7273	13.50902

Table 21

T-test of Mean Examination Scores for April 2013

		t-test for Equality of Means		
		t	df	Sig. (2-tailed)
Final Examination Scores for April 2013	Equal variances assumed	-2.942	54	.005
	Equal variances not assumed	-2.760	35.720	.009

The significance of the two-way ANOVA (see Table 14) on the overall mean examination scores between treatment and control groups was due to a difference in student achievement that occurred in the April 2013 semester while there was no difference in both October 2012 and January 2013 semesters, as illustrated in Figure 12, which shows the mean examination scores by student grouping by semester.

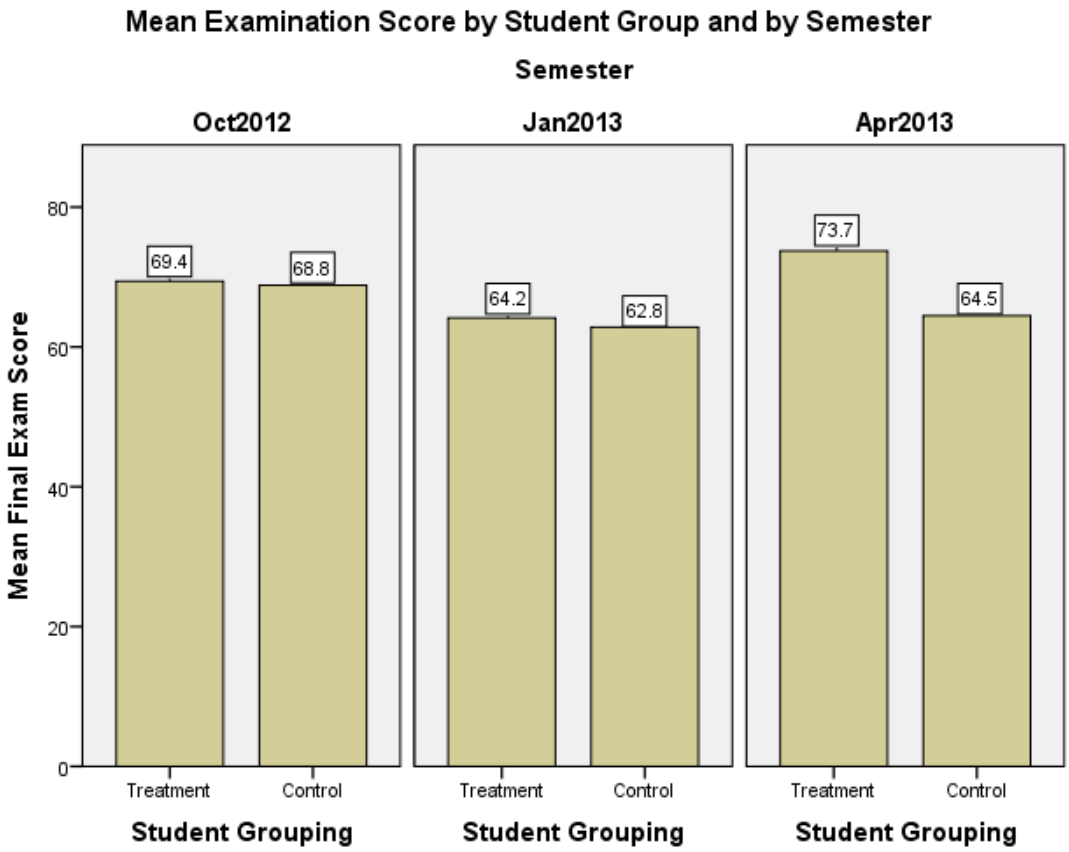

Figure 12: Mean Examination Score by Student Grouping by Semester

Research Question on Class-Size

Regarding the question on class-size:

- How does class-size affect student achievement within a synchronous web-conference environment?

End-of-course examination results for students in the semester of April 2013 provided the necessary data to investigate this question. The class-size of students learning with web conferencing in this semester was the smallest at 22 or 39% (compared to 25 (41%) in January 2013 and 31 (47%) in October 2012, respectively). According to Table 20, students in the treatment group have performed better (mean = 73.7) than those in the control group (mean = 64.5) as validated by the above t-test ($p=0.01<0.05$; reject H0 in favor of H1: that the mean

examination scores between the two groups are not the same; see Table 21). One possible explanation of this outcome could be due to students in the treatment group did gain a benefit from the examination preparation that was taught via web conferencing, an activity introduced for April 2013 following student feedback in previous semesters. The smaller class size (n=22) for April 2013 also made the mean examination score higher.

Research Question on Learning Experience

With reference to the question on student learning experience:

- What aspects of synchronous web-conference learning would enhance students' learning experience?

The student survey provided the data to investigate student learning experience in web conferencing (see Appendix E for the survey questions). Three semesters of data covering October 2012 ($n_1 = 25$), January 2013 ($n_2 = 22$), and April 2013 ($n_3 = 21$) were respectively analyzed.

Overall situation. For the students who participated in web conferencing in each of the three semesters, they indicated their overall learning experience based on a 7-point Likert scale (1 Least Positive; 7 Most Positive) in a survey (see Appendix E). The mean learning experience for each semester is shown in Table 22 and Figure 13, respectively.

Table 22

Mean Learning Experience

Semester	Mean	N	Std. Deviation
October 2012	4.24	25	.523
January 2013	5.36	22	1.136
April 2013	5.62	21	.865

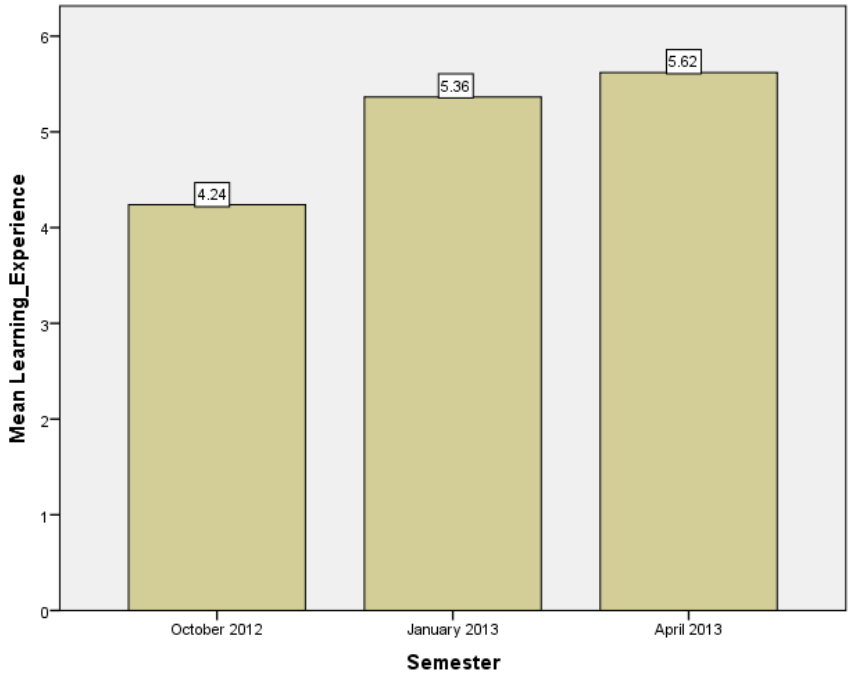

Figure 13: Mean Learning Experience

As Table 22 and Figure 12 illustrate, the students' overall mean learning experience was 5.03 for all three semesters with April 2013 (5.62) being the highest followed by January 2013 (5.36) and October 2012 (4.24), respectively. Overall the students' learning experience of web conferencing had been positive.

Step-wise multiple regression. A step-wise backward multiple regression was conducted to examine the relationship between 'Learning experience,' the dependent variable, and the following independent variables: 'Ease of use.', 'Audio,' 'Interaction,' 'Application sharing,' 'Duration,' 'Frequency,' and 'Video.'

The backward multiple regression was recommended by the UniSIM faculty members, who reviewed the study in a research seminar presented by the researcher-instructor. Step-wise regression is a technique whereby all the relevant independent variables are included in the initial regression analysis. Through a process of progressive iteration, the backward multiple regression would generate a set of regression models with the latest 'new' model being an improved version of the previous 'old' model (for example, Model 2 is better than Model 1, etc.). The final model, with all the unwanted independent variables eliminated, which is the most significant model, is adopted. See Appendix G for details of the various components of a multiple regression model. In this study, a step-wise backward multiple regression was undertaken, which generated the following 'best fit' models for each of the three semesters in which students participated in web conferencing:

October 2012. The 'best fit' multiple regression model ($F(3, 21) = 5.142$, $p = 0.008 < 0.05$) comprised 'Learning experience' as the dependent variable with three independent variables: 'Ease of use,' 'Interaction,' and 'Duration.' As shown in Table 23, 'Ease of use' ($p = 0.03 < 0.05$) and 'Duration' ($p = 0.15 < 0.05$) are statistically significant. The multiple squared correlation coefficient for this model is 0.42, indicating that some 42% of variability in student learning experience can be explained by ease of use of the web-conferencing system and duration of the session.

Table 23

Multiple Regression 'best fit' Model (October 2012)

	Unstandardized Coefficients		Standardized Coefficients	
Variable	B	Std Error	Beta	Sig.
(Constant)	4.348	.651		.000
Ease of Use	.442	.132	.660	.003
Interaction	.234	.141	.412	.056
Duration	.258	.097	.466	.015

$n = 25$, $r = .651$, $r^2 = .423$, $F(3, 21) = 5.142$, $p = .008 < .05$

Full detailed results of the 'best fit' backward multiple regression for October 2012 are shown in Appendices H, I, and J, respectively.

January 2013. The 'best fit' multiple regression model ($F(3, 18) = 6.238$, $p = 0.005 < 0.05$) comprised 'Learning experience' as the dependent variable with three independent variables: 'Ease of use,' 'Audio,' and 'Duration.' As shown in Table 24, only 'Ease of use' ($p = 0.002. < 0.05$) is statistically significant. The multiple squared correlation coefficient for this model is 0.51, indicating that some 51% of variability in student learning experience can be explained by ease of use of the web-conferencing system and duration of the session.

Table 24

Multiple Regression 'best fit' Model (January 2013)

	Unstandardized Coefficients		Standardized Coefficients	
Variable	B	Std Error	Beta	Sig.
(Constant)	1.687	1.195		.175
Ease of Use	.599	.162	.613	.002
Audio	.313	.175	.302	.091
Duration	.250	.141	.299	.095

$n = 22$, $r = .714$, $r^2 = .510$, $F(3, 18) = 6.238$, $p = .004 < .05$

Full detailed results of the 'best fit' backward multiple regression for January 2013 are shown in Appendices K, L, and M, respectively.

April 2013. The 'best fit' multiple regression model ($F(2, 18) = 7.483$, $p = 0.004. < 0.05$) comprised 'Learning experience' as the dependent variable with two independent variables: 'Ease of use,' and 'Duration.' As shown in Table 25, only 'Ease of use' ($p = 0.01 < 0.05$) is statistically significant. The multiple squared correlation coefficient for this model is 0.45, indicating that some 45% of variability in student learning experience can be explained by ease of use of the web-conferencing system and duration of the session.

Table 25

Multiple Regression 'best fit' Model (April 2013)

	Unstandardized Coefficients		Standardized Coefficients	
Variable	B	Std Error	Beta	Sig.
(Constant)	2.681	.804		.004
Ease of Use	.411	.142	.513	.010
Duration	.166	.084	.350	.064

$n = 21$, $r = .674$, $r^2 = .454$, $F(2, 18) = 7.483$, $p = .004 < .05$

Full detailed results of the 'best fit' backward multiple regression for April 2013 are shown in Appendices N, O, and P, respectively.

Interpretation. Among the various factors (Ease of use, Audio, Interaction, Application sharing, Duration, Frequency, and Video) analyzed, students' learning experience in web conferencing was attributable to their perception of 'Ease of use' and the actual 'Duration' of the web-conferencing session, though the latter factor was found to be significant in October 2012 ($p = 0.02 < 0.05$) but insignificant in April 2013 ($p = .06 > 0.05$).

Research Question on Pedagogy

Regarding the question on pedagogy:

- What are the features of an effective pedagogical model that can be adopted in a synchronous web-conference context?

Quantitative data in the form of learning analytics also provided some useful information for pedagogical consideration. At a system-administration level, the Blackboard Collaborate web-conferencing system provided the following types of reports in relation to each session:

- Meeting Information Report (see Appendix W)

- Session Attendance Report (see Appendix X)
- Attendee List Report (see Appendix Y)
- Export Recording File Report (see Appendix Z)
- Recording Access Log (see Appendix AA)

The *Meeting Information Report* shows the number of synchronous sessions created on a particular day. Taking the first live web-conferencing session of 9 October 2012 (11:30am to 3pm), for example, this report shows a total of 23 attendees accessing the session three times with the recording turned on (see Appendix W). In terms of what actually happened, this session was initially accessed twice by the researcher-instructor who login as the moderator to test its readiness before it was opened for full access by the 21 users (see Appendix X). As for details of the 21 participants present, their names are removed because of anonymity reason, and they are shown on the *Attendee List Report* (see Appendix Y). Information about session recordings and their access is shown in the *Export Recording File Report* (Appendix Z) and *Recording Access Log* (Appendix AA). In the case of the session held on 9 October 2012, Appendix Z shows that the recording was viewed 11 times while Appendix AA shows the IP address of the participants who viewed the recording. This session was viewed by seven participants, four of whom viewed it one time, two viewed it twice while one three times making a total of 11 viewings altogether. Table 26 shows a breakdown of the IP address of these seven participants.

Table 26

Participant IP Address and Recording-viewing Frequency

IP Address	Recording-viewing Frequency
202.172.246.7	3 times
58.182.53.37	2 times
42.61.33.156	2 times
222.165.97.89	1 time
182.55.169.10	1 time
127.7.224.147	1 time
203.2.35.163	1 time

The availability of such data about participants' attendance and their recording-viewing pattern could help inform pedagogical practice in the following ways:

- Student attendance - if student attendance dropped in subsequent sessions, the instructor could identify those students who were absent from the previous web-conferencing session and explain the previous topic to these students during break-time or end of the lesson so that they could catch up on the previous lesson. If the previous lesson involved either a tutorial or a lab exercise, the researcher-instructor could discuss and/or demonstrate the exercise again with these students. Alternatively, the instructor could ask these students to watch the recording of the last lesson if they have not done so already. This additional teaching support should be built into the instructor’s teaching plan as he/she prepared for the next lesson.

- Recording viewing – Collaborate could also capture viewers' e-mail addresses (if this function is turned on) in addition to their IP addresses. Knowing which group of students watched the lesson recording could mean they did not understand the lesson well and so additional teaching support could be provided for these students. Alternatively, for those students who did not watch the recording, the instructor could check with these students on their understanding of the previous topic and advised them to watch the recording or re-explained the topic as necessary. This targeted teaching support could be built into the instructor's teaching plan. In addition, the instructor could also introduce a quiz during the recording and ask those students who did not watch the recording about the quiz in the next lesson.

Part 2: Qualitative Data Analysis

Qualitative data based on student interviews and the researcher-instructor's reflective journals are discussed in this part of Chapter 4. A content analysis (Norton, 2009, pp. 115-130) was used to analyze both sets of qualitative data. The detailed process involved in conducting a content analysis is explained in Appendix Q.

Content Analysis of Interviews

Semi-structured interviews with nine student-participants were conducted by the Research Assistant (RA) for the October 2012 semester. The interviews took place in December 2012 after all the students have completed their examinations. The RA was specifically instructed not to contact the students until they have completed all of their examinations. Overall, the contents analysis generated 14 categories (see Appendix R), which were subsequently merged into the key themes of (1) Student Learning Experience, (2) Instructor Teaching Presence, and (3) Technological Issues. Interviews for January 2013 and April 2013 were also

conducted in a similar manner by the RA with the data analyzed by two further rounds of content analyses.

Student learning experience. All student-participants reported a positive and favorable learning experience with web conferencing in the semester of October 2012. Examples of why participants particularly liked this mode of learning include the removal of psychological barriers such as shyness and embarrassment which prevented them from speaking in a face-to-face classroom environment, and feeling comfortable in this environment. The embarrassment factor was mentioned by Student 6:

> "… it is intimidating to voice out during lectures. We do not have to suffer embarrassments or awkwardness when we voice out through the chat." (Student 6)

The problem of shyness was articulated by Students 4:

> "I love synchronous learning experience as it bonds we students and it gives students an opportunity to speak up through the microphone (less shy)." (Student 4)

As mentioned by Student 7, web conferencing provided students with a level of comfort over face-to-face settings when they are required to communicate with their peers and with the instructor:

> "Chat, because answering question through chat makes me feel more comfortable." (Student 7)

However, the downside of web conferencing is that participants are being left alone in the labs without instructor supervision. Student 9 admitted to this problem:

> "However, there was also more distraction, mostly from Internet because there was no teacher there who watched us so we can freely playing with computers (this may sound childish or what but that actually happened and I was one of them who was also playing with Internet when Mr. Yeung was explaining so after that I lost concentration and then quite blur about that particular topic." (Student 9)

A key factor that affected students' overall learning experience was concerned with the connectivity-speed of the campus network. To the student-participants' credit, they have accepted the slowness of the network as a normal constraint. For example (Student 1):

> "It is slow to login but acceptable. Loading speed was acceptable too" (Student 1)

However, Student 8 pointed out that the speed of the network did affect his/her web conferencing experience:

> "I think just for the connection. If the speed of the Internet is not fast, it will affect the audio. Poor, I hope SIM will make the Internet faster." (Student 8)

Student 7, in particular, expressed his/her frustration strongly:

> "However it can be annoying if the connection is bad. Improving the school's network will make the experience much better." (Student 7)

January 2013 and April 2013. Two further rounds of content analyses were also conducted for the January 2013 (with eight participants) and April 2013 (nine participants) semesters, respectively. The comments provided by these participants are similar to their peers in the October 2012 semester. The salient points on student learning experience are highlighted in Table 27.

Table 27

Student Learning Experience for January 2013 and April 2013.

Theme	January 2013	April 2013
Student Learning Experience	Synchronous learning is a new thing for me. (Student 1) Personally I think it is the most interesting way of learning. (Student 2) My overall learning experience is not bad. I think to study at home will be better. (Student 4) Overall, I find this synchronous learning a wonderful experience. It is easy, simple, and fun to use. (Student 5) I liked synchronous learning (Student 6). It was a very pleasant experience. (Student 7)	I had a very good experience. I enjoyed synchronous learning. (Student 3) Something new and a great experience that I never thought SIM would do or input into one of its modules for DMS (Student 4) His trial [the study] is interesting (Student 6)

In addition, the "mode of instruction" category may also affect student learning experience hence extracts of this category from the content analyses are shown in Table 28.

Table 28

Extracts of Content Analysis by Semester

Category	October 2012	January 2013	April 2013
Mode of Instruction	A mixture of both will keep learning fresh (Student 1) I prefer both learning. (Student 3) My preference is dependent on the topic covered during the lesson. (Student 7) I prefer both learning are taken. (Student 8) I am actually neutral because each mode has its own positive and negative side. (Student 9)	I prefer face-to-face lecture. (Student 1) I prefer both face to face and synchronous learning. (Student 3) I find the synchronous learning in the lab quite fun and interesting. (Student 5). I think it is nice to have lessons through synchronous learning in the lab, but face-to-face in the lecture theatre is better. (Student 6)	I prefer face-to-face lectures. (Student 1) I am still undecided. (Student 2) I would prefer face-to-face learning. (Student 3) I most definitely would prefer the synchronous learning in the lab. (Student 4) Face-to-face lectures. (Student 9)

Instructor teaching presence. In the October 2012 semester, students provided comments on the researcher-instructor's behaviors and character. In particular, empathy, attitude, patience, passion, immediacy of response, organizational skills, and communication clarity were the most-valued attributes. In particular, Student 2 noted the instructor's attitude and his ability to empathize with the class:

> "Yes, he makes a module that isn't the most favorable module and keeps it at an acceptable level. Mr. Yeung has the right attitude to teach the modern generation. As he has earned the respect from his students, as opposed to demanding it. He is someone who goes beyond the subject and he knows the emotions of the students. He understands the anxiety and the basic behaviors of his students in the lab. He then allows the students to let out this 'anxiety' by drawing and playing around with the used presentation slides." (Student 2)

Patience was noted by both Student 3 and Student 6:

> "Mr. Yeung's teaching style is effective for the students who join the synchronous learning. I like Mr. Yeung's lecture. Because he was very nice in teaching us and very patient." (Student 3)

> "I think he suits synchronous learning since he is very patient and calm in teaching, so when there's a problem, he would face it calmly." (Student 6)

Student 9 spoke about the instructor's passion and immediacy of response:

> "Yes. Actually, I honestly think Mr. Yeung is a great teacher who is really competent and has passion, hence the way he teaches either in class or via synchronous learning was effective and truthfully most of students that I know liked his teaching style. I can feel that he has passion and really wanted us to gain something useful through his lessons and its great. He always checked whether the participants in the lab could understand clearly or not since he was not with us. He also gave quick responses in chat when a student asked questions." (Student 9)

Regarding organizational skills, the ability of the instructor to coordinate with the class across three different locations simultaneously was noted by Student 5:

> "Definitely, Mr Yeung shows how the system being worked and also able to coordinate well with the students regardless being in 3 different classes, 2 labs and 1 lecture theatre." (Student 5)

However, according to Student 4, more efforts should be put in by the instructor in order to make the course more interesting:

> "Mr Yeung should make the lecture more interesting as he couldn't really get most of the students' attention as the modules are really dry and difficult to understand to a person who do not know anything about information technology." (Student 4)

Elsewhere, the Communication category revealed useful findings about the instructor's teaching presence. The ability of the instructor to speak with a native accent of English was recognized as important by two students:

> "His native accent when speaking English makes learning more effective because it is unique like a primary key field. It helps as suddenly you can remember his voice in your head while memorizing for exams, which acts as a spark to remembering things." (Student 6)

> "He also does not have Singlish/Chinese accent and the way he explained things is understandable and clear from the headset. He could explain things clearly using simple language which was easy to understand and his intonation and pronunciation were clear to be heard from headset." (Student 9).

January 2013 and April 2013. The comments provided by students in the subsequent two semesters about the researcher-instructor's teaching presence are summarized in Table 29.

Table 29

Instructor Teaching Presence for January 2013 and April 2013.

Theme	January 2013	April 2013
Instructor Teaching Presence	He is very patient with the students. His voice is loud and clear. Get acknowledgement from students just to make sure that they are still with him. (Student 3)	Mr Yeung is a very focused lecturer (Student 1)
	OK. I'm fine with his teaching. Sometimes his sound not so louder, so using the synchronous learning is more suitable for us. (Student 4)	He conducts synchronous learning step by step (Student 2)
	His demonstration was very clear, and pronunciation was excellent. A very observant and excellent teacher. I think he's synchronous learning is nearly perfect. (Student 5)	He makes us understand and ensures that we never leave the class without understanding what is being taught. (Student 4)
	He knew how to get or check the attention from students through the chat and he used whiteboard very well in the teaching. (Student 6)	He is quite experience in conducting this system and he do give clear explanations for us so that we can use this system without much problems.(Student 8)
	He does the lecture systematically following the slides given and does not jump back and forth which makes it effective in using the synchronous learning. (Student 8)	Mr Yeung's teaching style is definitely suitable for synchronous learning. He makes sure that students shows responses before he proceed to the next point so that there are no students lagging behind. (Student 9)

Technological issues. The third area on technological issues was divided into three categories comprising (1) synchronous system functions, (2) synchronous learning offerings, and (3) mobile learning. All participants in the October 2012 semester preferred the use of chat over audio and most have found the recording useful. For example:

> "Chat and recording. Chat allows others to visually see the questions and answers. Recording allows a channel to check back on the lesson." (Student 1)
> "I like chat the most. I don't like the audio aspect as in we (the students) who have to speak via microphone." (Student 3)

As for the offering of synchronous learning for other courses, participants are neutral but generally supportive of the idea. Lastly, only one student would like to use a mobile device:

> "If possible using tab like iPad." (Student 9).

January 2013 and April 2013. Extracts of students comments are shown in Table 30.

Table 30

Technological Issues for January 2013 and April 2013.

Theme	January 2013	April 2013
Technological Issues	Network speed slow or not available because of Distributed Denial of Services attacks which affected all students and the instructor. Recording (like) and Audio (dislike). The quality of the voice is the major problem. (Student 1) Recording. As I can use it during my revision class or if I was absent. I watched the recorded session several times for my revision and it did help my revision. (Student 2) The greatest advantage is that the synchronous learning lecture can be recorded and can be re-watched countless times. (Student 5)	Network speed slow (all students) Recording. (liked by Student 1) Whiteboard function (liked by Student 2) I liked the recording … disliked the chatting part (Student 3) I like the whiteboard (Student 5) The audio and whiteboard part (liked) but application sharing (dislike) as the system doesn't work well and we cannot see clearly. (Student 7) I prefer the recording (Student 8) The chat room is what I like the least (Student 8) Recording (liked) and disliked the chat (Student 9)

Other categories. In addition to the above themes, the content analyses also generated other categories of student comments that are directly or indirectly relevant to pedagogy and they are captured in Tables 31 and 32, respectively.

Table 31

Other Categories for October 2012

Category	Student Comments
Fact-to-face students	However, I was thinking about the students in class who never join the synchronous learning. They cannot hear well what Mr Yeung says during class. Because Mr Yeung was talking to us via microphone. I think something can be done to solve this problem. (Student 3) However, one of my friends told me, when they are in class. They cannot hear what were teacher explaining about. So, I think you should put more concern for the class, because we are in the lab can hear clearly. (Student 8) I believe that our attention span is a problem during face-to-face lectures and in addition. Being in a lecture room is intimidating to voice out your opinions or thoughts especially for people who are more introverted. (Student 6)
Participatory / active learning	Everybody can try to answer, it helps us to learn to be active. (Student 3) Yes. As we discuss in the chat log for our answers so we do learn from each other from there. (Student 4) However, in the lab, more students are daring and more questions are being thrown out to Mr Yeung. And when it is in virtually, they tend to show themselves. (Student 5) Also, students are less shy which makes them more responsive. (Student 7)
Instructor appearance on video (webcam)	Visually seeing him helps focus. (Student 1) I would rather have Mr Yeung on webcam. I believe that if it was just a voice, not many students will not be able to focus if there was no face. If it was just a voice, it would remove the human element of the entire process. (Student 2) It's very effective to use the video. If Mr Yeung never use the video, I think the situation in the lab will not be like in lecture. It will be boring, and everyone will start to open other application. By using video, at least everyone can see Mr Yeung and feel that they are taught by him (face to face). (Student 3) It is useful as we can see the expression of Mr Yeung. If the webcam is not turned on, it will be just someone that is randomly speaking and we could not focus as our eyes tend to wander around frequently. With a live webcam being casted, we tend to focus more that I have personally experienced. (Student 5)
Instructional contents	Website design (Student 1) I think he can conduct exam briefing in synchronous learning. It helps a lot for the exams. (Student 3) Lab 2 Website Design. (Student 4) Basically, I would dare to say all of them as this application makes the lesson more fresh and fun where all the students able to hear our voices, see how the application being done by Mr Yeung such as the database and webpage building. (Student 5) Lab demonstration. Because we learn things we have not learnt. (Student 6)

Table 32

Other Categories for January 2013 and April 2013

Category	January 2013	April 2013
All Other Categories	Tutorial. (Student 1) Website design. (Student 3, 4 & 5) Tutorial. Lab 2 website design. (Student 7) Tutorial because he records the entire tutorial discussion. (Student 8) Preferred to see instructor appearing on webcam (Student 2, 4, 5, 6 & 7) No need to appear on webcam (Student 1 & 8)	Exam briefing in synchronous learning will be helpful (Student 1) Enable synchronous learning to be done outside of school's premises Synchronous learning would be a good choice if it could be conducted at home. (Student 7) Be allowed to study at home … but there must be an attendance system to ensure participants do log on. (Student 4) Tutorial and lab demonstration are particularly useful. (Student 2) First few lab sessions were so helpful to do our CA. (Student 6) Lab 2 Website Design (Student 9) Preferred to see instructor appearing on webcam (Student 2, 4, 5, 8 & 9) No need to appear on webcam (Student 1 & 6)

Content Analysis of Reflective Journals

A content analysis of the researcher-instructor's reflective journals was undertaken to uncover the pedagogical and technological patterns that emerged from the study. The analysis revealed seven themes that occurred over the semesters of October 2012, January 2013, and April 2013, respectively. They include (1) synchronous system functions, (2) instructional methods, (3) instructor teaching presence, (4) student learning experience, (5) face-to-face students, (6) technology and network issues, and (7) ethics. Each theme is discussed with relevant extracts from the reflective journals accordingly.

Synchronous system functions. The recording is a very useful function and it was used for every web-conferencing session:

> "I turned on the recording, welcomed them into Collaborate and praised them for their patience while waiting for the rest to login."

> "A recording of this segment of S1 was made to show the participants the full capabilities of Collaborate."

Chat is another function that was well liked by the participants:

> "The participants were responding on the Chat to my question of how to create a second webpage."

Besides recording and chat, application sharing was also a very useful function especially for lab demonstrations (see Instructional Methods below). It could also be used for presenting Word documents but the display was not as instantaneous as the whiteboard:

> "When I shared my Word 2007 via Collaborate it worked rather well despite the initial delay."

However, the audio was not a popular function among the participants as they preferred to use the chat instead:

> "The participants who login from Lab2.35….asked me lots of questions on the chat."

The Web Tour is another useful function for showing webpages and it was introduced to the participants:

> "I also had the opportunity to use Collaborate's Web Tour to show students about the downloadable revision guide."

Instructional methods. In the October 2012 semester, the researcher-instructor's method of instruction was based on the traditional lecture-delivery method that he had been accustomed to over the years of teaching at UniSIM. As such he tried to replicate this form of delivery in web conferencing but acknowledged its pedagogical limitation:

> "I began the session by continuing with the lecture with illustrations on Topic 2. We also did Tutorial 2 together."

> "The only pedagogical problem I noticed was the rather lengthy lecture I had to deliver."

Nevertheless, there was pedagogical success from the use of application sharing, letting students take ownership of their learning, and fostering a safe environment for reflective learning:

> "The Access application that I shared across the participants' computer went very well….I customized the demonstration by focusing on two questions (relating to database report and query) after showing the class how to create the initial database table with data."

> "I used application sharing to demonstrate the Lab 1 exercise of constructing a homepage for the 'A-Mart' online clothing store."

> "I simply let the students took responsibility for their own learning by asking them to discuss and share with the class [about] the tutorial questions. Those students…..in face-to-face mode shared their answers with the participants via me (I conveyed their answers to those in the lab) while the participants' comments and answers via the chat were shown to everyone [face-to-face students] on the big screen."

> "Good learning moments….came about due to the reciprocal behavior of both groups of students [web conferencing and face-to-face]."

> "As I reflect on yesterday's final synchronous session with satisfaction, the key pedagogical principle that I managed to put into practice is to actively engage the participants through encouragement, support and empathy so as to create a safe learning environment in which they could thrive in their own reflective learning."

The experience learned from the first semester was put into practice in both January 2013 and April 2013 in that lecturing in web conferencing was kept to a minimum and to focus on one or two items only. In fact as early as the first session, lab demonstration of web-site design was performed using application sharing:

> "Two pedagogical findings are observed from today's first synchronous session: (1) explain to participants the importance of good online behavior, and
> (2) be realistic and focus on one single item only when using application sharing to demonstrate learning."

> "Tutorial 3 [was the only item of learning for a session in April 2013]."

> "I showed the class "Topic 7 Learning Summary" and briefly explained about this one-page document on Blackboard Collaborate and then handed out a hardcopy to everyone (I also went back to Lab2.35 to debrief and distribute the hardcopy to the participants)."

As a result of the previous semester's participant feedback, learning support for examination was conducted early for both the January 2013 and April 2013 semesters via web conferencing:

> "EQP [Examination Question Paper] Discussion: Topic 2 & 3."
>
> "The activity we worked on was about a tutorial on past examination questions relating to topic 2 and 3."
>
> "S5 focused on one activity only: working on an examination tutorial question covering topics 4 and 5."

while a more interactive form of engagement with the participants was also introduced:

> "I invited the participants to use the Chat, the Pen or the Text Box to write their answers on the Chat Box or the Whiteboard."

A shift in instructional approach was necessary as a result of severe network failure (see Technology and Network Issues below). The use of pre-recording was found to be an effective, alternative option:

> 'I recorded a demonstration using application sharing of the Access Lab exercise….Several student-participants were able to show me their Access database created based on this exercise. Clearly, my recorded lab-demonstration has helped them."
>
> "Given that all students are experiencing "lab fatique"… I have embedded S6, a pre-recorded session with Blackboard Collaborate, into today's lesson and delivered as part of my lecture on topic 8 in LT4.35. Participants were provided with the option to view S6 again. "

Another instructional shift occurred in April 2013 to improve participants' learning experience by providing them with a quicker start to a web-conferencing session. This was done with the researcher-instructor and face-to-face students moving back to the LT from the lab instead of the participants who were already in Lab2.35:

> "Instead of the usual "participants go to the lab" approach, I tried something new for a change: the instructor (i.e. me) moved to a different location to conduct the session….Participants were asked to login S2 [from a Lab2.35] while those non-participating students followed me back to LT2.21 from where I login S2."

Also, the break time was used for the participants to login so by the time the actual web-conferencing started, all the participants would have already login and ready to begin the session:

> "I set the session start time at 1:20pm so that the participants would use their break [between 1pm to 1:20pm] to go to Lab 2.35 to login."

A key pedagogical improvement from the previous semester was that learning support for examination was conducted in web conferencing via a live recording:

> "I took the opportunity to turn Lesson 14 into a synchronous session [on examination revision]….and conducted a live recording in the lecture theatre for all students in face-to-face mode…unfortunately, in keeping with the spirit of this research study, only student-participants got to view the recording."

> "S7 is the final synchronous session of the semester (April 2013) with Class 5B. We covered the following two activities in Lab2.35:
> Quick Review of Tutorial 8
> Exam Briefing"

The incremental pedagogical improvements of the previous two semesters (such as minimizing lecture-delivery, focusing on one or two items, faster student login, and greater emphasis on examination-support) have led to a pedagogical discovery in April 2013 in the form of mobile 'recording' learning with the development of the Personal Learning Assistant (PLA):

> "A pedagogical breakthrough emerged last week … it occurred to me that the best way for students to use the recording is to view it on a mobile device such as an iPad…This method of learning is non-intrusive compares to … a student works on the exercise while viewing the recording on his/her computer simultaneously [the need to switch between screens/applications]….when a student views the recording on iPad, for example, and listens to the instructor's step-wise explanation over a headphone while [doing] the exercise on the computer, he/she is experiencing seamless learning."

Instructor teaching presence. The use of the webcam was a way for the researcher-instructor to demonstrate his teaching presence:

> "To add authenticity into my synchronous sessions, I have decided to use the webcam and to turn on the video in Collaborate."

Interaction was another:

> "I had conducted the session with plenty of content and social interactions."
>
> "I facilitated the learning through my teaching and social presence."

Keeping self-emotion under controlled during a live web-conferencing session that went wrong (see Technology and Network Issues below) was an attribute learned by the researcher-instructor in January 2013:

> "An important point worth noting is that I did not show my frustration in front of the students as a result of the non-functioning network…I explained about the network problem to the class and thanked the participants for keep trying to login Collaborate."
>
> "I reminded myself to stay calm, composed and not to show my negative emotions so as not to affect students' mood for learning."
>
> "On reflection, I am glad to report that I have succeeded in keeping my own emotions under control throughout the whole of S5."

Student learning experience. It is the belief of the researcher-instructor that in order for the students to have a good learning experience in web conferencing they need to be comfortable with the system. Accordingly, student orientation would take place before the first web-conferencing session. For example:

> "I gave the class an Orientation Session (October 2012) on Collaborate by demonstrating the following:
>
> Explained about the synchronous session URL:
> http://tinyurl.com/BUS017-S0-Oct12
> Session login as "student"
> Test headset in the Audio Wizard for audio input and output
> How to use Emoticons
> How to use the Chat Box
> How to use audio with the "Talk" button
> Demonstrating Collaborate's video function by turning on my webcam"

> "As for the actual Orientation Session (January 2013), it went better than I had expected thanks to the availability of wired Internet connection for laptops for the first time [in the LT]."

> "The participants freely explored the various features of Collaborate by "playing around" with chat, audio, emoticon and the whiteboard [in April 2013]….giving the participants a free hand was the best way to get them excited about synchronous learning."

Authenticity of learning was another recurring theme:

> "With my video turned on, all the "participants" were able to see me visually and it has added a level of authenticity for the audience (both students and participants)."

Active learning was also observed by the researcher-instructor:

> "The difference in the audience's reaction to synchronous learning was immediately noticeable. While there was no difference in the way the students were learning passively face-to-face in class, the participants, on the other hand, were lively in their chat participation. Many would readily type answers in the chat box to the questions that I had posed to the class."

> "As I went through each tutorial question, I asked the participants to first discuss their answers on the Chat and then one participant would write the correct answer on the Whiteboard using a Textbox at the correct location next [to] the question."

Another practice adopted by the researcher-instructor was holding a face-to-face debriefing sessions with the participants to assess their interest in web conferencing:

> "After the session was over, I sent the students to work on their assignment in Lab4.35 while I went to see the participants in Lab2.35 to give them a debrief. I thanked them for their participation and I could sense their interest and enthusiasm in this kind of learning."

> "Demonstrated the power of real-time video by carrying the laptop with the webcam still switched on as I walked back to Lab2.35 for participant debrief."

Unfortunately, the participants did not find it comfortable when they were required to make a presentation via audio:

> "When I invited the first participant to talk about his assignment-learning experience….[he] read the report out for everyone (participants on headsets and the [face-to-face] students and me on loud speakers in the classroom) to hear."

As such, audio presentation was not set as a compulsory activity in January 2013 and April 2013 though participants were encouraged to use the audio but few took up the opportunity as they preferred to use the Chat instead.

Face-to-face students. Participation from the face-to-face students was generally less compared with students on web conferencing:

> "There was no difference in the way the students were learning passively face-to-face in class."
>
> "Face-to-face students also contributed but their level of participation was less than the participants, I observed."

As a result of the simultaneous delivery of the lesson to two groups of students based in different locations, the face-to-face students were affected in that they could not hear the researcher-instructor's teaching:

> "A student in LT4.36 told me that he could not hear me. I explained this was because I was now using a headset to talk to both students (face-to-face) in LT4.36 and participants (online) in Lab2.35 …As I cannot shout into my headset (my voice would be very loud over the participants' headset), I invited the students to come forward to sit closer in the first two rows of the lecture theatre."

Technology and network issues. Given the synchronous nature of the study, the only way to ensure technological problems do not interrupt a web-conferencing session was to conduct test sessions before each live session:

> "I also setup a test session on Blackboard Collaborate v11, the day before, to test the whiteboard display of the following course materials in PowerPoint (PPT) format:
>
> Course notes for Topic 2: Computer Hardware – Inside the System Unit
> Diagram illustrations
> Tutorial 2"

Displaying learning contents as individual files had its limitation on Collaborate's whiteboard because it is compatible with PPT files only (i.e. other file types such as Word documents had to

be converted into PPT files before they could be uploaded to whiteboard – a tedious and time-consuming process). A more efficient way to handle non-PPT files was to use Collaborate's 'camera/paste/capture' method, a technique recommended by Mr Stephen Rowe, which significant improved the content-creation process on the whiteboard. This success of using Collaborate better was noted:

> "Topic 7 Learning Summary is a Word document and I used Collaborate's 'camera/paste/capture' method to display this one-page table on the whiteboard (this is a real time-saver)….Topic 7 (Computer Ethics & Security) is a large and difficult topic …. I found that having a one-page summary helps with students' learning."

Another technological success achieved in the October 2012 semester was proving that the mass broadcast of audio from participants in web conferencing to face-to-face students was possible:

> "Audio output from my computer [was] connected to the lecture theatre's loud speakers so that the students who are with me in the classroom could hear the participants' audio."

Unfortunately, four web-conferencing sessions were affected in January 2013 due to network failure:

> "Today's network in the school was so problematic that only one student-participant could login (Session 4)."

> "My worst fear for a synchronous session happened in today's S5 …did not start at all due to network login failure (Session 5)."

Eventually the cause of this network error was discovered when Blackboard revealed that their Collaborate servers had experienced cyber-attacks:

> "Today, I received an e-mail announcement (dated 16 Feb 2013) from the President of Blackboard Collaborate explaining that the system has not been performing normally in recent weeks because of the "Distributed Denial of Service" (DDoS) attacks on its host system."

Fortunately, by the April 2013 semester, the network problem was resolved:

> "My biggest concern for the new semester was about the reliability of the campus network and the availability of Blackboard."
>
> "To my relief…the campus network and Collaborate worked well and the Orientation went smoothly."

While using two computers for web-conferencing teaching with the aim of improving participants' learning experience through faster instructor login (i.e. setup the lecture computer without webcam with Collaborate login before the start of the lesson and switched over to the laptop computer with webcam later), this approach had inadvertently created a 'dual-audio output' problem:

> "For a moment, I got confused by my own audio…broadcasted over the large public speaker in the lecture theatre….The reason why this occurred was because I had used the instructor computer for projection and by default both computer screen and its audio output are broadcasted through the LT's projection/audio system….To stop my own audio-output from coming out of the LT speakers, I turned the audio/speaker indicator on the instructor computer to "mute" and this dual-audio problem was solved."

Ethics. The practice of working with a Research Assistant (RA) was introduced at the beginning of the study in order to fulfill Athabasca University's Research Ethics Board (REB) requirements of distancing the researcher-instructor from influencing the students' participation in the study:

> "I appointed two RAs (instead of one) who are students studying in SIM's University of London (UOL) undergraduate programme….The rationale behind appointing two RAs is that in the event that one student could not come into my class because she needs to attend her own UOL lesson then I could call on the second RA as a backup."

Another ethical issue that occurred in each of the three semesters was concerned with students' improper behavior when they experienced web conferencing for the first time. As a result of the experience learned when working with a group of students in a pilot test, etiquette was taught to the students and their behavioral problems were dealt with at the beginning in each semester:

> "Before I send the participants into Lab 2.35, I also informed them of the following points of etiquette:
>
> Raise hand to speak
> Respect classmates in chat
> Do not shout and use abusive language in chat
> Do not exhibit bad behaviour online (i.e. being rude and disruptive"
> (October 2012)

> "I requested them to behave properly online by not shouting and using abusive language in chat. When one participant wrote "gay" on the whiteboard in reference to a fellow classmate, I told him/her to 'be careful.'" (January 2013)

> "A few participants got too excited by making funny jokes on the chat and login without their real names. I reminded them about etiquette and that in the next session they have to login properly." (April 2013)

Reflection. From the researcher-instructor's perspective, the above content analysis of his reflective journals has identified themes that are consistent with those reported in the analysis of student interviews with the exception of (1) 'Instructional Methods,' and (2) 'Ethics,' which did not appear as themes from the students' perspective. On 'Synchronous System Functions,' the popularity of the chat, recording, and webcam functions were obvious and easily identified while 'Instructional Methods' provided much qualitative data on pedagogy. Essentially, the need to (1) minimize lecturing, (2) focus on one or two activities with participation, and (3) place greater emphasis on examination-support, was found to be the pedagogical successes that contributed to students' positive learning in web conferencing. Regarding 'Instructor Teaching Presence,' the use of the webcam provided the authenticity sought by students while keeping emotions under control when a live web-conferencing session went wrong was also an important learning point. As for 'Student Learning Experience,' it was found that providing students with a "free hand" to try out web conferencing during Orientation while laying out the ground rules on etiquette (see Ethics above) and conducting debriefing sessions were helpful in contributing to a good learning experience for the participants. Face-to-face students were found to be

participating less compared to their web-conferencing counterparts. Lastly, 'Technology and Network Issues,' provided both successful and problematic learning experiences for the researcher-instructor such as content-display, mass-audio output, and system breakdown (due to cyber-attacks).

Content Analysis and Pedagogy

Based on the above content analyses, a pedagogical approach that could be adopted for web conferencing would be one that emphasizes on instructor teaching presence with attributes such as empathy, attitude, patience, passion, immediacy of response, organizational skills, and communication clarity, while at the content level, hands-on lab activities, tutorial discussions and examination preparation are more beneficial to student learning than lecture presentation. At a technological level, the chat, webcam/video, and recording are effective tools for learning. Netiquette, as pointed out in the reflective journals, is also an important part of the pedagogical practice in web conferencing. A possible pedagogical model based on these findings was formulated and it is discussed in Chapter 5.

Students' positive learning experience was due to the removal of psychological barriers such as shyness and embarrassment and the feeling of being comfortable in a safe and respectful learning environment. The downside, however, was that participants in the labs were left alone without supervision and the slow speed of the campus network affected their learning. Other factors such as communication with the instructor, the opportunity for participatory learning, and lab-based learning (website design) were also relevant. Most student-participants agreed that having the instructor appearing on the webcam was necessary as this helped with their perception of instructor teaching presence. Also student-participants preferred the chat over audio and that

they have found the recording useful with some participants suggesting studying at home as an alternative option to the labs. Interestingly, one participant from the April 2013 semester summed up the overall pedagogical benefits and limitations of web conferencing with the following well-observed comment:

> "My learning experience is enriched with the introduction of synchronous learning. The synchronous learning has made learning at home possible. However, while synchronous learning may be good, it also has its limitations as mentioned above. I personally think that Mr. Yeung should merge both face-to-face and synchronous learning together to achieve a maximized effectiveness. Mr. Yeung could use synchronous learning for lessons which requires more practical demonstrations and use lectures for more theory-based lessons. I think the idea of synchronous learning should be experimented further to see whether most of the students are benefitting from it." (Student 9)

Another participant, also from the same semester, pointed out the limitation of lab demonstrations:

> "But in lab demonstration, the only drawback is that we can't do our lab simultaneously when he demo it to us." (Student 2)

The Personal Learning Assistant (PLA), discussed in the next chapter, is a tool developed from this study to address this student's particular learning needs.

Pedagogical pattern. The pedagogical action research approach adopted in this study has been effective for investigating pedagogy as it involved the researcher-instructor as a member of the participants who experienced directly the teaching and learning issues in a cyclical, systematic, reflective, and collaborative manner (Norton, 2009) with a view of making improvements in the subsequent instructional cycle. The development of pedagogy for web conferencing from one phase to the next was informed by the actions learned from the previous phase of action research as highlighted by Table 33, which shows the pedagogical pattern developed iteratively between the semesters of October 2012, January 2013, and April 2013, respectively.

Table 33

Iterative Pedagogical Pattern

Semester	Pedagogical Pattern
October 2012	• Conducted all web-conferencing sessions with the webcam switched on for authentic learning (for all three semesters). • Conducted Orientation with (1) system demonstration and (2) etiquette briefing. • Provided personal attention to participants by calling their names. • Replicated face-to-face lecturing and tutorial in web conferencing. • Uploaded learning contents to Whiteboard as static PPT files. • Experimented with Application Sharing for lab demonstrations. • Made compulsory audio-presentation by students.
January 2013	• Conducted Orientation with (1) system demonstration, (2) etiquette briefing, and (3) free practice. • Kept lecturing in web conferencing to a minimum. • Focused on facilitating one or two learning activities only. • Created a safe and respectful environment for learning. • Used "camera/copy/paste" function to build contents on Whiteboard. Conducted tutorial discussions with past examination questions early in the semester. • Set interactive tutorial questions and encouraged students to participate by writing/drawing on the Whiteboard. • Conducted all lab demonstrations using Application Sharing. • Introduced pre-recorded activity as part of the lesson delivery. • Encouraged students to use audio but did not make it compulsory.
April 2013	• Continued with the pedagogical practice of January 2013 plus: • Included examination briefing with recording as part of the learning activities. • Reduced instructor and student login time. • Introduced the Personal Learning Assistant for mobile learning.

Summary

In this chapter, the quantitative and qualitative data from the study were processed and analyzed. The quantitative data was analyzed in the totality of the data with a two-way ANOVA

and a Chi-squared test followed by the t-tests conducted at semester level. The results obtained were discussed in relation to each research question. Regarding the questions on student achievement and class-size, end-of-course examination results were analyzed and no significant difference was found between students in web conferencing (treatment) compared to those in face-to-face learning (control) over the three semesters except for April 2013, which saw the treatment group performed slightly better than the control group with a higher mean examination score. Qualitative data was analyzed by conducting content analysis of (1) the semi-structured interviews with students, and (2) the reflective journals provided by the researcher-instructor, to inform the iterative development of pedagogy for web conferencing. In relation to the question on student learning experience, the survey data was analyzed using the backward multiple regression technique with 'ease of use' and 'duration' emerged as significant factors affecting students' learning experience. The content analyses also provided a theme on 'Student Learning Experience' from the interviews and most students reported positively on their web-conferencing experience. The researcher-instructor's reflective journals also provided similar findings. Chapter 5 will discuss the key events that shaped the teaching and learning practice of web conferencing in each semester, the external review conducted for October 2012, the formulation of a pedagogical model, and the development of the personal learning assistant.

Chapter V – RESULTS AND DISCUSSION

Having completed the analyses of data in Chapter 4, the focus of this chapter is to discuss the results and findings. In order to provide the situational context that led to the findings, the key events that occurred in each semester, including inputs by an external reviewer for the October 2012 semester, are reviewed first before the findings, such as the personal learning assistant and the pedagogical model, are discussed. To complete the chapter, issues concerning validity and reliability of the study are also discussed.

Review of Key Semester Events

October 2012. This was the first semester in which the study of web conferencing went live for the first time. The key issues and experience learned from this semester centered on the deployment of the web-conferencing system (Blackboard Collaborate v11) and the role played by the Research Assistant (RA) in the recruitment of participant-volunteers for this study. Naturally, all the necessary system testing and preparation work had to be carried out before the start of the semester and full details of this work are documented in Journal#1 (see Appendix S1). In particular, the meetings with the RA before and after the first lesson (2 October 2012) were crucial to the success of the study as the RA played a very important role in recruiting participants without the presence of the researcher-instructor because of ethical reasons. In accordance with the requirements of Athabasca University's Research Ethics Board (REB), the researcher-instructor detached himself totally from the participant-recruitment process by leaving the classroom at the beginning of the first and second lessons to allow the RA to administer the work. As noted in Journal#1 (see Appendix S1), the RA managed to recruit 31/65 participants (47%). The teaching and learning issues and operational problems encountered with web conferencing are reported in subsequent journals (see Appendices S2 to S8).

January 2013. The major issue encountered in January 2013 concerned the non-availability of Blackboard Collaborate in the second half of the semester. At the beginning of the semester, the web-conferencing system was working well and the pedagogical experience learned from the previous semester was put into practice. In particular, the shift from lecture teaching to tutorial discussions with the participants writing on text-boxes, created in real-time by the researcher-instructor, to answer the tutorial questions on the whiteboard was evident (see Journal#4 in Appendix T4). From the participants' perspective, interacting with the whiteboard is another method of peer-learning, in addition to the chat, which allowed them to co-construct knowledge together. From 31 January 2013 onwards (see Journal#5 in Appendix T5), however, the web-conferencing system (Collaborate) experienced delays in startup. It was a frustrating period for all involved (participants and the researcher-instructor) because the waiting time (over 20mins) for Collaborate to launch was too long and it became unacceptable despite everyone's patience. At first the problem was thought to be related to the campus network but this was not the case as confirmed by the various network-speed tests conducted by IT Support Services. Eventually, the cause of the problem was found when Blackboard issued an e-mail letter on 16 February 2013 to all affected institutions world-wide to inform them about Collaborate experiencing ‘Distributed Denial of Service (DDoS)’ attacks from hackers (see Appendix AE). For those web-conferencing sessions that could not be conducted in real-time in the second half of the semester, the researcher-instructor used Collaborate's recording function to pre-record parts of the lesson that were planned for web conferencing. These recorded sessions covered topics such as (a) database development, which involved demonstrating relational database in Microsoft Access 2007, and (b) briefing on examination. The topic on database was particularly suitable for pre-recording because the teaching and learning requirements were based on

software demonstration. However, participants were unable to practice their learning in web conferencing because of system unavailability.

April 2013. A major pedagogical development was the creation of the Personal Learning Assistant (PLA), a term describing the kind of 21st century learning support that is now possible for students because of the convergence of Internet and mobile technologies. The PLA will be discussed later in this chapter.

External Review

An external review was provided by Mr. Stephen Rowe of Southern Cross University (SCU) in Australia. Mr. Rowe teaches Accountancy and Auditing in the Southern Cross Business School (SCBS). He is also the Deputy Head of SCBS and its Director of Teaching and Learning. Mr. Rowe practices web conferencing by using Blackboard Collaborate for his teaching at SCU. With a strong interest in advancing pedagogical developments in web conferencing, Mr. Rowe is keen to play the role of an external reviewer in this study. It followed that, for the October 2012 semester, Mr. Rowe meticulously reviewed the recordings of all seven web-conferencing sessions conducted by the researcher-instructor and provided feedback on six sessions. The transcripts of his review are shown in Appendices V1 to V6. The key findings are summarized in Tables 34 and 35 below.

Table 34

External Review (Session 1 to 4)

Web-conferencing Session	External Reviewer's Observation
S1(9 Oct)	Acknowledged the researcher-instructor's ease and familiarity in using the key features (pointer, chat, emoticons and audio) of web-conferencing system in conducting his first session. Suggested to try using the Poll function also. Noted that some students encountered audio problem. Advised to show the image interface (which shows the audio setup wizard menu) rather than asking students to logout/login to avoid interrupting/delaying the students. Recognized the researcher-instructor's use of humor in making the students at ease. Contents displayed on the whiteboard are clear and effective. Letting students take control of the whiteboard is a good way to get them involved in the lesson. Pointed out the different "appearance" of the two groups (control and treatment) of students in that the treatment group showed all the students' names while the control group doesn't (because they are in a face-to-face setting). Need to pay attention to the control group also to prevent the treatment group from dominating the learning/discussion.
S2 (16 Oct)	Mr. Rowe did not provide comment for S2: "I have not made any notes for Lab 2 as the comments are quite similar to my thoughts for Topic 2, noted earlier."
S3 (18 Oct)	Observed the researcher-instructor's use of multiple whiteboard slides in building up a list of tutorial questions with answers appearing after the discussion of each question. Suggested using one single page only and cover up the answers with a "filled" text-box. Regarding the tutorial questions, recommended that they be divided into three parts and ask three sub-groups of students to work on them. Noted that student, Chih Seng, attended the session from Lab3.35 (two labs were available – most students went to Lab2.35), illustrating the "studying anywhere" concept of web conferencing. Liked the way the researcher-instructor "bring together" all the students in three different locations (LT, Lab2.35 & Lab3.35).
S4 (22 Oct)	Noted that students in the online group (treatment) were always addressed/greeted by their full names (because the names are shown on the system) by the researcher-instructor whereas those in the face-to-face group did not receive this kind of personal attention - illustrating the ease of providing a personalized learning experience for the online group and a lack of it for the control group. Liked the way the researcher-instructor asked student, Hasan, to hold back from dominating the discussion. Pointed out the difference between the two groups of students and the way they learn/understand the topic when one group (control) could see a real life example of a network equipment (the wireless access point in the LT) while the other (treatment) could not.

Table 35

External Review (Session 5 to 7)

Web-conferencing Session	External Reviewer's Observation
S5 (29 Oct)	This session on topic 7 (computer security) is one of the hardest to teach regardless of whether it is in face-to-face or web-conferencing mode because much contents have to be learned by the students in one lesson. To aid student learning, the researcher-instructor created a one-page learning summary table comprising the keywords and concepts. This learning summary table was presented via Collaborate and Mr. Rowe quite rightly pointed out that the researcher-instructor should consider using "filled' text-boxes to gradually unfold the answers along with the discussion. He also noted the need to pay attention to non-responsive students online by asking them to respond to questions on a poll or the chat.
S6 (6 Nov)	Mr. Rowe noticed the lack of audio input from the student-participants. From the beginning of the semester I have been aware of this situation which is not uncommon among Asian students: their preference for listening rather than speaking in class. For the online participants, they are, by now, accustomed to learning actively with the chat or whiteboard. In fact, I had planned to encourage these online students to use audio in the next session (S7) but to do that I needed to provide them with the proper learning context (i.e. what topic should they discuss?). S6 gave me the opportunity to do that when I provided feedback to all the students on their assignment performance. In return, I asked them to speak about their assignment-learning experience in S7. I discussed this pedagogical approach with Mr. Rowe when he visited SIM University on 12 October 2012 and he pointed out that it was "by design that you did not want them using audio until the final session," which was untrue because the students simply did not like talking on audio so I created a session to make them use the audio. Separately, in response to the delays experienced with Application Sharing, Mr. Rowe suggested a better way of using the page up/down keys instead of scrolling up/down with the side bar in order to minimize refresh.
S7 (8 Nov)	Mr. Rowe noted the online students participating in an audio-sharing of their assignment-learning experience and gave suggestions on controlling the echoes. In a normal synchronous session in which all the participants online are communicating via headsets there would not be "echo" problems. However, because of the face-to-face students (control group) who were in the lecture theatre (LT) and that the researcher-instructor had wanted them to listen to the online students speaking, the audio output on the researcher-instructor's computer was connected to the main LT speakers instead (rather than to his headset). The echo came about because of this technical-setup reason and Mr. Rowe gave some good advice on how to minimize it. For example: "when Hasan first spoke, you will notice the echo ... remember in the main room, you need to turn your mic off to avoid the feedback…" and "you will also notice that it is wise to just let the individual talk rather than treat it like a conversation and the quality of the sound will be even better." Despite the technical/audio hiccups, Mr. Rowe concluded his observation of S7 on a positive note: "good to hear the students laugh and enjoying the contributions."

Personal Learning Assistant

At a technological level, it is now possible for participants to access a web-conferencing session using mobile devices such as the iPad. In fact, Blackboard has released a version of Collaborate designed for the iPad. In terms of pedagogical support, a mobile device is useful for showing short videos on tasks that involve step-wise demonstrations. The Access Lab of Topic 8 (Database Management System) provided the necessary problem suitable for this kind of mobile-pedagogical development. Accordingly, a web-conferencing session (S6) was conducted for the Access Lab with recording (see Journal#5 in Appendix U5). The benefits of recording the Access Lab are that for those students who were absent from the lesson or for those who wanted to review/re-learn the steps of building a database in Microsoft Access, they could simply watch the recording. However, when viewing on a computer (desktop or laptop), the need to switch from one screen/window (Collaborate recording) to another (Microsoft Access) makes the learning inefficient. Given that most students own mobile devices such as the iPad, if the recording of the Access Lab is made available on iPad, for example, then students could view it on their mobile devices and at the same time build the database on the computer without the interruption caused by screen-switching.

Unfortunately, while Collaborate web conferencing for iPad is available, its recording is not. Basically, at the moment it is not possible to watch a Collaborate recording on the iPad. Nevertheless, Blackboard recommends that the local version of a Collaborate recording in MP4 format be hosted on an online service such as YouTube. Accordingly, the researcher-instructor explored this possibility and made it possible for students to view a recording of the Access Lab on the iPad. This pedagogical development of using mobile technology to support learning was demonstrated to the students in web-conferencing session S7 on 10 May 2013 (see Journal#6 in

Appendix U6). The combination of mobile device with wireless Internet access (technology) showing the Access Lab demonstration (pedagogy) on YouTube makes it possible for each student to be engaged in a personalized and non-intrusive manner of learning. In short, for a student who owns an iPad, he/she would be carrying a so-called "Personal Learning Assistant" in the pocket. An example of the PLA is shown in Figure 14.

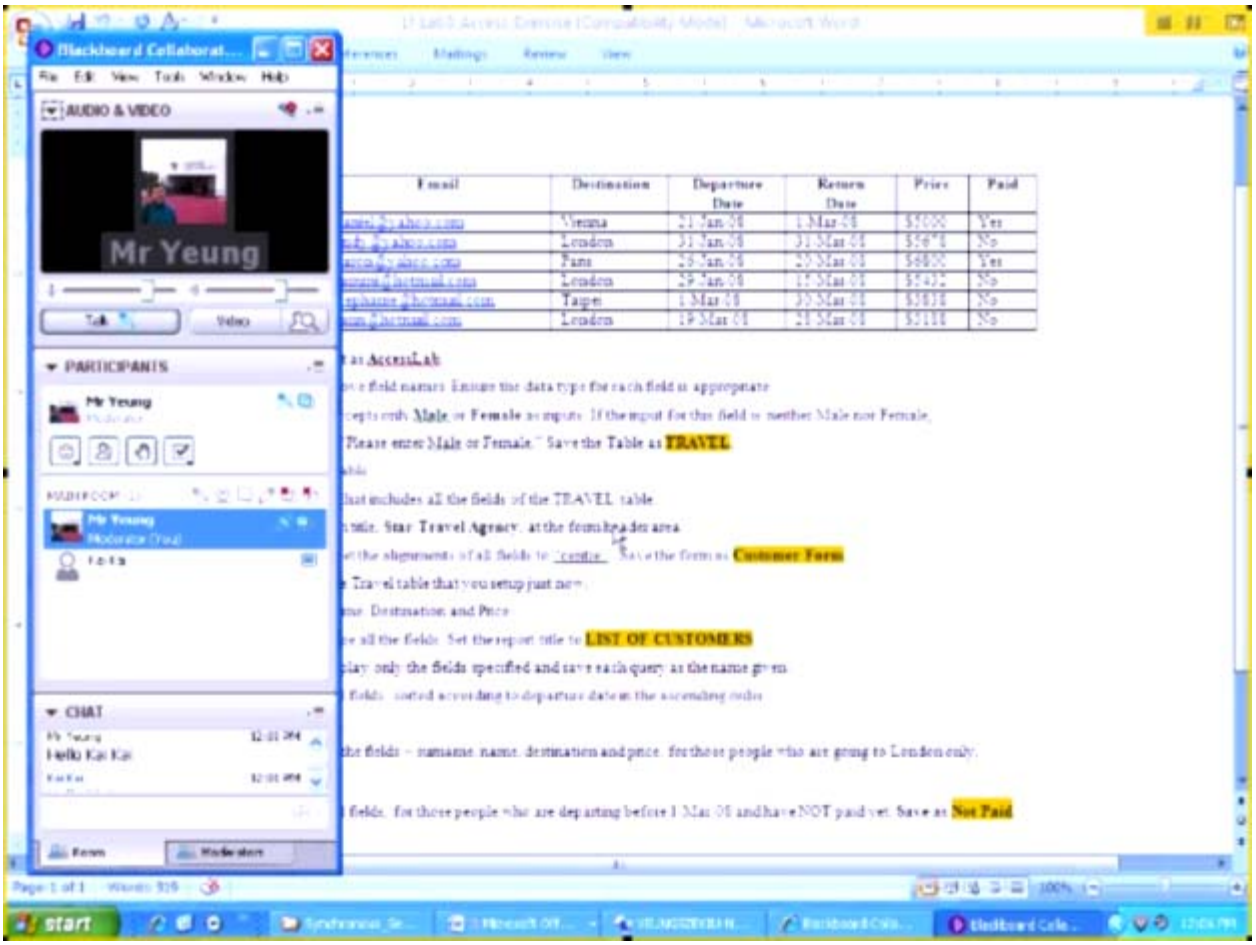

Figure 14: The Personal Learning Assistant (PLA)

While it could be argued that such a recording could be done using other kinds of video-capturing technology such as iMovie or Camtasia, Collaborate's recording, on the other hand, offered students a personal learning experience because the students were themselves actors in web conferencing. Interestingly, Dr. Mohamed Ally also spoke about 'learning in the pocket'

and ‘ bring your own device’ (Ally, 2013) in his presentation on mobile learning to the UniSIM faculty on 24 June 2013.

Pedagogical Model

Regarding the research question on what constituted a suitable pedagogical model for web conferencing, the shift from lecture-style presentation to activity-based facilitation and demonstration was evident according to the data obtained from student interviews and from the researcher-instructor’s reflective journals. Building a personal connection (through addressing each student by his/her full name) with the students online and encouraging all to express themselves (using chat, whiteboard, polling, emoticons, and audio) in web conferencing are strategies that should be included in any pedagogical model. Figure 15 shows a graphical illustration of this pedagogical model (a full-scale version can be found in Appendix AG).

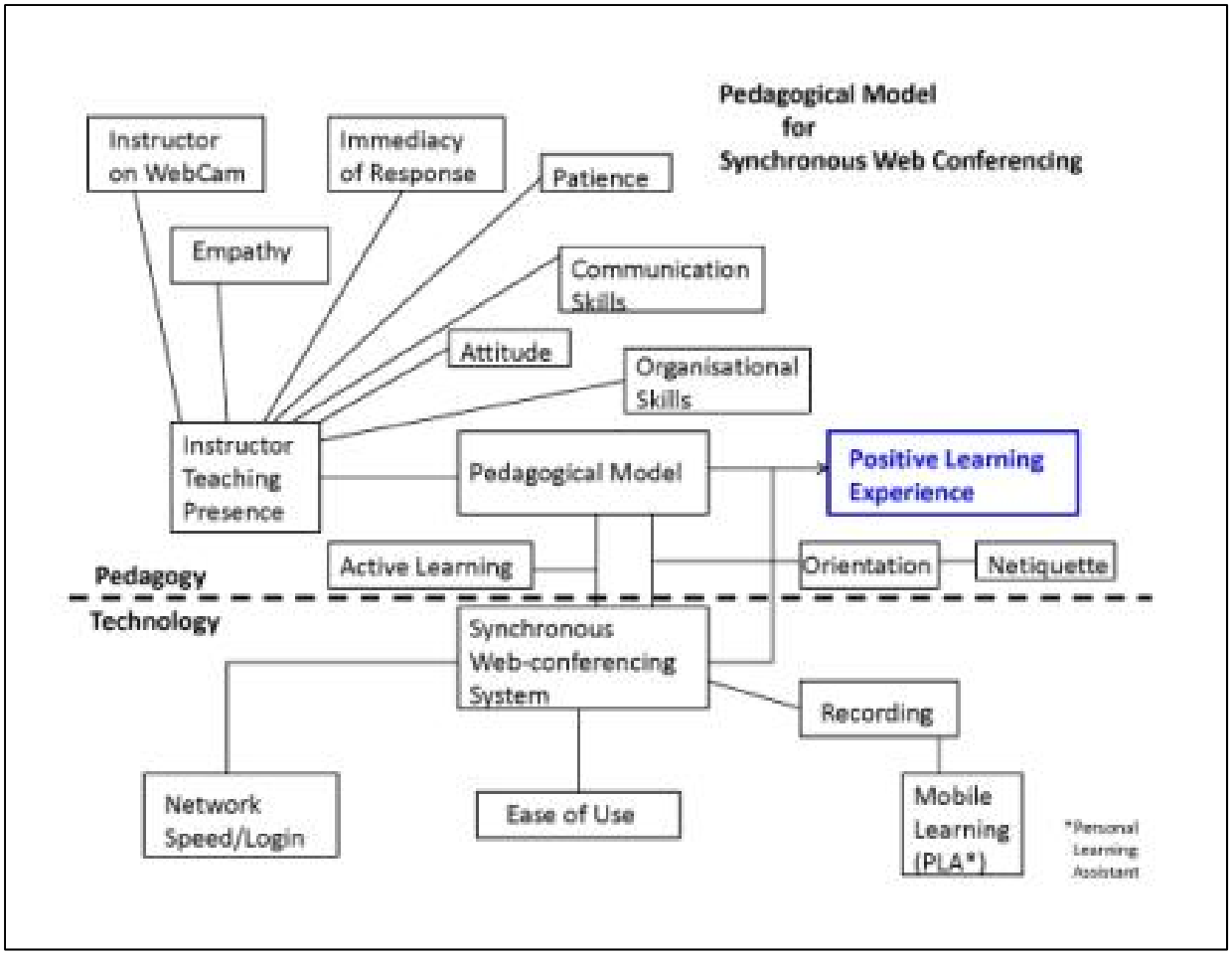

Figure 15: Pedagogical Model for Synchronous Web Conferencing

Description of pedagogical model. As Figure 15 illustrates, the pedagogical model derived from this study operates at two levels: pedagogy and technology. At the pedagogical level, factors that contributed to student positive learning experience include instructor teaching presence and netiquette, for example. Based on these attributes, the pedagogy of active learning was practiced through several sessions of live demonstrations of the lab exercises that included web-site design and database development. At the technological level, students' learning was supported by the web-conferencing system. However, the lessons learned from this study have revealed both weaknesses and strengths web conferencing. As reported by the students, a slow and non-responsive network as well as distraction from the Internet (some participants admitted

that without face-to-face instructor supervision, they would surf the web instead of learning the course) had affected their learning experience. Nevertheless, they were compensated by the system's ease of use and that they felt more comfortable communicating with their peers and instructor in web conferencing, which shielded them from the pressure and embarrassment of speaking in the classroom. Furthermore, all participants recognized the advantages of having recorded lessons, which led to the creation of the personal learning assistant for mobile learning.

Reflection on pedagogical model. As part of the title of this study: 'Towards a pedagogical model for effective distributed learning,' suggests, the goal is to construct a pedagogical model based on the study's findings. Accordingly, such a model was developed and it could be considered and applied to other similar web conferencing situations. As explained above, this model illustrates the factors (pedagogy and technology) and attributes (instructor teaching presence, netiquette, etc.) that need to be considered in order to provide students with an effective, positive learning experience. The distributed-learning element of this study was implemented in the labs and while the student participants were indeed distributed to another location, the attendance requirements of SIM University and the Singapore Immigration and Checkpoint Authority (for foreign students) meant that they were not freely distributed to study from home. In fact, some participants have indicated a preference for attending web conferencing from home and if the university permits this method of learning then a real distributed-learning experience could be achieved.

Validity and Reliability

Issues concerning validity and reliability, from both qualitative and quantitative perspectives, are discussed here. The topics of validity and reliability are broad with wide-ranging concepts and definitions but essentially they are about the accuracy of the research in

terms of data acquisition and measurement. From a qualitative perspective, according to Winter (2000), validity refers to the honesty, depth, richness of the data, the participants approached, and the objectivity of the researcher while Cohen et al. (2008) extended these concepts further to include internal validity, which refers to having confidence in and ensuring authenticity of the data. Similarly, Lincoln and Guba (1985) viewed research reliability in terms of its credibility, neutrality, and trustworthiness. In the context of this study, the issues of qualitative validity and reliability are summarized in Table 36.

Table 36

Qualitative Validity and Reliability

Issues	Validity and Reliability
Honesty, confidence, authenticity, credibility and trustworthiness	The investigation on web conferencing was conducted with three different classes of students taking the Information Systems for Business (BUS017) course in the Diploma in Management Studies (DMS) program over three semesters between October 2012, January 2013, and April 2013. All were registered students of SIM University (UniSIM) and they attended the lessons on campus at UniSIM. The students' end-of-course examination results were provided by the Examination Administration Department.
Depth & richness of the data	Interviews with the students provided the depth and richness of the data especially on the intangible quality of pedagogy. In addition, deep reflections on the successes and problems of web conferencing were captured by the researcher-instructor's reflective journals while critique and observations were carefully provided by an external reviewer.
Participants approached	Only the voluntary participants from each class were contacted for their survey and interview inputs since they were the only students exposed to web conferencing (the intervention). Importantly, the students were only contacted by the Research Assistant for interviews after they had completed their examinations so that their DMS studies were not affected by participating in this research study.
Researcher objectivity and neutrality	While conventional research views the involvement of the researcher as a member of the participants with concerns from the viewpoint of objectivity and neutrality, the fact that the instructor is the researcher is a unique feature of this study. Being "on the ground" and having direct exposure of the pedagogical and technological issues make this an altogether richer experience for both the instructor and students because by being involved in the action is always better than being an observer of the action. Regarding the researcher's objectivity and neutrality, these concerns were addressed by (1) the Research Assistant who conducted the recruitment of participants (without any interference from the researcher-instructor) as well as conducting surveys and interviews with them; and (2) the External Reviewer who provided feedback and observation on the researcher-instructor's teaching in web conferencing. Importantly, two separate submissions for ethical review were made to Athabasca University (AU) and SIM University (UniSIM), respectively. Approval was granted by AU's Research Ethics Board (REB) - see Appendix AB - while UniSIM's Institutional Review Board (IRB) was not necessary.

Quantitative validity and reliability, on the other hand, refer to the statistical treatment and consistency of the data and whether it can be generalized to the wider population, a concept known as external validity (Cohen et al., 2008; Winter. 2000). As discussed in Chapter 4, the end-of-course results have yielded similar results in that there was no significant difference in student achievement between students who received instruction in web conferencing (treatment group) and those who received face-to-face instruction (control group) for the October 2012 and January 2013 semesters, respectively. However, students in the April 2013 semester did perform better in the treatment group compared with those in the control group. In terms of generalizing the results to the wider population, the October 2012 and January 2013 semesters provided consistency findings but they should be viewed with caution because of the small sample size ($n < 35$). The survey data, on the other hand, has provided a consistent pattern of positive learning experience among the students in all three semesters.

Triangulation. Lastly, triangulation is an important concept relating to validity and reliability. It is an attempt to explain research outcomes by making use of both qualitative and quantitative data. As Campbell and Fiske (1959) pointed out, triangulation is a powerful way of demonstrating the concept of concurrent validity, particularly in qualitative research. Examples of triangulation in this study can be found in the factors affecting students' learning experience such as (1) ease-of-use, (2) recording, and (3) their preference for seeing the instructor appearing on the webcam, as highlighted from the student surveys and interviews. With regard to pedagogy, both student interviews and the instructor's reflective journals indicated that web conferencing is good for demonstrative learning such as website design, for example, and that examination-support should be included as part of the pedagogy for web conferencing.

Furthermore, both quantitative and qualitative data has reported that the students have had a positive learning experience with web conferencing.

Summary

This chapter described the key events that occurred in each of the three semesters in which web conferencing was conducted in order to provide the situational context that led to the research outcomes. In addition, the external review provided by an expert practitioner also helped the researcher-instructor to refine his pedagogical approach for web conferencing. Such a review is akin to the face-to-face class audits that are practiced at SIM University in which a faculty member would attend a class to observe the instructor's teaching. The difference in reviewing lessons conducted in web conferencing is that the audit can be carried out post-lessons thanks to the recordings that are accessible anywhere in the world (the external reviewer watched the recordings from the Southern Cross University in Australia). In terms of the outcomes arising from this study: (1) the Personal Learning Assistant (PLA), and (2) the Pedagogical Model, the former came about as a result of the researcher-instructor's reflection and thinking about how each web-conferencing session could be conducted better or differently, while the latter was developed based on the data analyzed. Lastly, this chapter also addressed the issues of validity, reliability and triangulation. The next, final chapter will consolidate all aspects of this study into a detailed conclusion.

Chapter VI - CONCLUSIONS

Theoretical Position

Overall, this study has examined the theoretical position in relation to both the technological and pedagogical aspects of web conferencing. Consideration was given to adopt *Blackboard™ Collaborate* as the web-conference system for this study according to the literature on the selection (Bates, 2005) and adoption (Reushle & Loche, 2008; Rowe & Ellis, 2010) of technology. Apart from the literature's theoretical inputs, the researcher's knowledge of Collaborate's predecessor, Elluminate, which he used while studying on the EdD in Distance Education program with Athabasca University was also an important factor for its adoption. As for the study's pedagogical position, it was informed by theoretical models including (1) Laurillard's (2002) Conversational Framework, (2) Mishra and Kohler's (2006) Pedagogical Technological Content Knowledge Framework, and (3) Norton's (2009) Pedagogical Action Research (PAR). Interestingly, the use of PAR was mentioned by Professor Diana Laurillard who attended the researcher's presentation at last year's e-Learning Forum Asia (2013) Conference in Hong Kong's Baptist University. In her keynote presentation on *Pedagogy as a Design Science* (Laurillard, 2012), Professor Laurillard made the following quote:

> I also like to reference Sze Kiu Yeung whose talk this morning mentioned Norton's work on the pedagogical action research cycle which is to reflect, plan, act, and observe and going over that cycle again except that we share it and it is sharing and building on each other's work, which enables us to act like [pedagogical] design scientists. (Laurillard, 2013)

Methodological Position

Regarding paradigm and methodology, the study took the position of the pragmatic/transformative paradigm (Mackenzie and Knipe, 2006) and investigated the research problem through a cross-sectional study based on the mixed-methods of combining quantitative and qualitative data. In terms of design, Campbell and Stanley's (1963) quasi-experiment of *pretest-post-test non-equivalent group design* was adopted while issues concerning ethics, feasibility, practicalities, testing, and timelines were also discussed as part of the procedures of the study. Importantly, it is noteworthy to remind the reader that in order to conduct this kind of "action" study in which the researcher was also a member of the participants, the involvement of a research assistant (RA) was crucial in order to safeguard the study against potential bias. In this regard, the recruitment and contribution of the RA played a significant role in the ethical conduct of this study. Lastly, the data arising from student surveys and interviews and the researcher's reflective journals were cross-referenced and triangulated in order to provide an informed analysis of the findings.

Limitations and Delimitations

Given that this study was based on 'the researcher as the participant' concept, bias and a lack of objectivity were the potential limitations because, as explained above, the instructor also took on the role of the researcher. However, this dilemma was unavoidable given the situational constraints because it was unrealistic to implement web conferencing for a group of instructors as no one at UniSIM had conducted lessons in this manner before prior to this study. Another limitation was the restriction imposed on students to use web conferencing in the computer-labs only because of attendance requirements.

Regarding delimitation, this study was delimited to focus on one course (Information Systems for Business) only over a period of nine months (three semesters). In addition, the topic

of remote desktop support (RDS) was also delimited after the Supervisory Committee advised that the work done was beyond the scope of this study. RDS is a part of the web-conference system's remote-control functionality and it was tested for one-to-one learning support. Rather than discarding the tacit knowledge gained from the test sessions, it was documented as a reflective journal (see Appendix AF).

Findings

Regarding the research question on student achievement, given that no significant difference was found between the treatment and control groups over the first two semesters (October 2012 and January 2013), the study concluded that the use of web conferencing did not significantly improve students' learning. As for the question on class-size for the April 2013 semester (n=22), the fact that students in the treatment group did score higher exam results, on average, compared to the control group, it suggested that web conferencing did influence students' learning in a small-class setting. In terms of what made web conferencing offered a better learning experience for students, 'ease of use,' 'chat,' and 'webcam' were factors revealed by the surveys and interviews. Regarding the research question on pedagogy, a pedagogical model was formulated (see Appendix AG). Furthermore, all participants recognized the advantages of having recorded lessons, which led to the development of the personal learning assistant. Lastly, netiquette and free-practice were important elements of any pedagogical model for web conferencing.

Significance of the Study

Adoption of web conferencing at UniSIM. The School of Science and Technology at UniSIM has adopted web conferencing for teaching and learning for 35 of its courses in the January 2014 semester as a result of this study. The pedagogical and technical issues experienced

have been discussed by faculty members in e-learning sharing sessions. The interim findings of this study have been shared with the UniSIM faculty. The full findings will be presented to the University and this thesis will also be submitted to the Centre for Applied Research in order to fulfill its original objective of making a contribution to the on-going pedagogical development of online teaching and learning at UniSIM. On a practical level, the lessons learned from this study have been shared with faculty colleagues. They include (1) setting up a backup plan to activate web conferencing without the Blackboard LMS, (2) the importance of providing netiquette-training for students, (3) the need to conduct test sessions before each live run, (4) the limitation of video-streaming, and (5) how to deal with a slow network.

Personal learning assistant. The personal learning assistant (PLA) is an unexpected outcome of this study. Students are now able to receive multimedia-learning contents in a format delivered to their own mobile devices at a time of their own choosing. The PLA offered a non-intrusive learning experience for students as they did not need to switch between screens in order to work on activities. It is an example of the application of technology for 21st century learning. According to the 2013 Horizon Report (Johnson, Adams Becker, Cummins, Estrada, Freeman, & Ludgate, 2013), mobile computing is one of the near-term (next 12 months) technologies to enter into mainstream use for teaching and learning in higher education institutions.

Future Studies

Future research could extend the study of pedagogy in web conferencing to the following areas:

(i) pedagogical action research with a group of instructors;

(ii) student participation from home;

(iii) mobile learning; and

(iv) remote-desktop support.

Final Observation

As a result of this study, the objective of narrowing the literature gap, as pointed out by de Freitas and Neumann (2009), on pedagogy in a synchronous-online environment has, to some extent, been achieved. With regard to technology, this study has gone beyond the original concept of using desktop and laptop computers for web conferencing to include mobile devices as well (see Appendix AL on mobile web conferencing). This technological shift is significant and unavoidable in view of the rapid, emerging trends and developments that are taking place in mobile learning. Conducting live teaching and learning activities online with a group of learners is a challenging yet rewarding undertaking. As this study has shown, with sufficient testing and planning behind each web-conferencing session, it can be a richly rewarding experience for both learners and instructor. Conversely, if the technology does not work it can be frustrating for everyone. For educational researchers who believe in this kind of technologies, they would welcome a study on mobile web conferencing.

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APPENDIX A - Centre for Applied Research (CFAR) Grant Approval Letter

SIM UNIVERSITY

17 August 2011

Mr Yeung Sze Kiu
School of Business

Dear Sze Kiu,

Title of Research Project: Synchronous and Asynchronous Computer-mediated Instructions and their Impact on Class-size

1. I am pleased to inform you that your application for a research grant has been approved by the Applied Research Committee.

2. The total grant amount approved is **$10,000.00** comprising the following:

a) Consumables	Elluminate Licences, Audio Headsets	$	10,000
	Total	**$**	**10,000**

3. The official reference number for your research grant is **RF11SBZ01**. You are required to quote this reference number in all correspondence relating to the grant, including all requisitions, reimbursement claims and invoices.

4. In connection with the reimbursement of claims, kindly note that you are required to submit the original invoice (and not a statement of account or duplicate bills) when making your claims.

5. Please complete the project within the approved project duration: **15 August 2011 to 28 June 2013**.

6. For as long as the project is active, you are required to submit a Half-Yearly Progress Report during the first working day of January and the first working day of July. Within one month of the project completion date, you are required to submit a Final Report and the Completed Research Report.

7. All the progress and final reports should be submitted to CFAR through the UniSIM e-Repository (http://r.unisim.edu.sg).

8. Kindly note that all purchases pertaining to Computer Equipment, Machinery & Equipment, Infrastructure and other durable items made with funds from the research grant are the property of the Centre for Applied Research (CFAR) and should be returned to CFAR upon completion of the project.

9. Thank you and wishing you success in your research endeavour.

Dr Vincent Chua
Acting Director
Centre for Applied Research

www.unisim.edu.sg
SIM University 461 Clementi Road Singapore 599491 Tel: (65) 6248 9777 Fax: (65) 6469 9312 (UEN:200504979Z)

APPENDIX B - Diploma in Management Studies (DMS) - Curriculum

Program Objective

The Diploma in Management Studies (DMS) program is designed to provide a wide variety of training in vital management skills and knowledge including accountancy, finance, marketing, human resource management, operations management, information technology, decision sciences, law, communications, and economics.

Program Nature

The 15-month full-time program covers 15 subjects across 5 semesters. Lectures consist of both international and local students with the average teacher student ratio of 1: 88. The diploma is awarded by SIM University, Singapore.

Mode of Delivery of Course

The course is 100% face-to-face lecture. The course work includes attendance of lectures, discussions of case studies, presentations, completion of group and individual written assignments.

Curriculum

- English for Business
- Business Mathematics
- Managing People and Organisations
- Business Communication
- Financial Accounting
- Business Statistics
- Managerial Accounting
- Managing Human Resources
- Principles of Marketing
- Microeconomics
- Operations and Total Quality Management
- Business Finance
- Business Law
- Information Systems for Business
- Macroeconomics

APPENDIX C - Diploma in Management Studies (DMS) - Admission

Diploma in Management Studies (Full-Time Program)

Applicants must be at least 17 years old and meet one of these minimum pre-requisites for direct admission to the Diploma in Management Studies (Full-time) program.

General Entrance Requirement

Five GCE 'O' level passes (grade 1 to 6) including English as a first language;
Other qualifications will be assessed based on the equivalence to GCE 'O' level examinations

For International Applicants (Full-time program only)

International applicants will be assessed on their qualification's equivalent to the GCE 'O' level examinations.

Country	Qualification (GCE 'O' Level Equivalent)
India	▪ Secondary School Certificate (Year 10) from ISC/CBSE/Maharashtra State Board/Gujarat Board/Kerala Board : Best 5 subjects must be at least 70%; otherwise ▪ Senior School Certificate (Year 12) from other State Boards: Overall for 5 subjects should be at least 70%
Indonesia	▪ SMA Ujian Akhir Nasional (UAN) : Overall score based on best 6 subjects must be at least 40; OR ▪ STTB SMA or SMA / SMU Ebtanas; overall score based on best 7 subjects must be at least 46
Malaysia	▪ SPM : 5 credit passes (A1to C6 or A+ to C) and English (at least 3B/B+) ▪ UEC : 5 credit passes (A1 - B6) including English (at least B3) *Placement Test is required if English is not B3 or better.
Myanmar	▪ Basic Education High School (BEHS) : Average of best 5 subjects must be at least 70%
China	▪ Senior High School Leaving Certificate with National College Entrance (total score > 60%)
South Korea	▪ High School Diploma : -With minimum average grade of C
Sri Lanka	▪ 2 GCE / Sri Lanka 'A' level credit passes.
Thailand	▪ High School Certificate [Mathayom Suksa 6 (M6)]: With GPA of 2.6 out of 4.
Vietnam	▪ Senior High School Certificate : Minimum overall average of 6.5

English Language Requirement

- GCE 'O' level credit pass in English; or
- IELTS with an overall score of at least 5.5; or
- TOEFL score of at least 550 (paper-based) or 213 (computer-based) plus 4 in the Test of Written English (TWE); or
- an equivalent English Language qualification

APPENDIX D - Timelines

	Activity	2011				2012												2013								
		Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	Web-conferencing software licence & headset purchase for 100 users	X																								
2	EDDE805 Research Seminar 1	X	X	X	X																					
3	Research Proposal Writing			X	X	X	X	X	X																	
4	Literature Review		X	X																						
5	Research Design			X	X	X																				
6	Testing web-conferencing software Installation in Labs	X																								
7	Questionaire Design	X																								
8	Conduct synchronous teaching for BUS017 - Testing		X	X		X	X																			
9	Progress Report 1 (for UniSIM)				X																					
10	Proposal Submission to AU for Candidacy Oral Examination								X																	
11	Candidacy Oral Examination										X															
12	Post-proposal rewrite & re-submission to AU										X	X														
13	Ethics application submission to & approval by AU's Research Ethics Board (REB)												X	X												
14	Conduct synchronous teaching for BUS017 - Testing								X	X																
15	Data collection - Testing										X															
16	Progress Report 2 (for UniSIM)										X															
17	Conduct synchronous teaching for BUS017 - Phase 1														X	X										
18	Data collection - Phase 1																X									
19	EDDE806 Research Seminar II													X	X	X	X									
20	Conduct synchronous teaching for BUS017 - Phase 2																	X	X							
21	Data collection - Phase 2																			X						
22	Progress Report 3 & 4 (for UniSIM)																X						X			
23	Conduct synchronous teaching for BUS017 - Phase 3																				X	X				
24	Data collection - Phase 3																						X			
25	Conduct synchronous teaching for BUS017 - Phase 4																							X	X	
26	Data collection - Phase 4																									X
27	Literature Review - update														X	X		X	X		X	X				
28	Research Design - update														X	X		X	X		X	X				
29	Data Entry													X			X			X			X			
30	Data Analysis													X			X			X			X			
31	Research Dissertation Writing & Review														X	X	X	X	X	X	X	X	X	X	X	
32	Research Dissertation Submission (to Athabasca University)																									X
33	Research Dissertation Defence (with Athabasca University)																									X
34	Post-dissertation review & re-submission to AU																									X
	Start Date: 1 Sep 2011							End Dates: 31 Aug 2013 (Research Intervention); 30 Sep 2013 (Research Dissertation)																		

APPENDIX E - Survey Questions

1. Is this the first time you have used a web-based conferencing system such as Blackboard Collaborate for learning?
Yes – first time [ ] No – I have used a web-conferencing system before [ ]

2. On a scale between 1 (Not Easy) to 7 (Very Easy), how easy to use have you found Blackboard Collaborate as a system for synchronous learning?

1. [ ] Not Easy 2. [ ] 3. [ ] 4. [ ] Neutral 5. [ ] 6.[ ] 7.[ ] Very Easy

3. Would you prefer to have more opportunity to practise your audio skill in synchronous learning?

1. [ ] Not Necessary 2. [ ] 3. [ ] 4. [ ] Neutral 5. [ ] 6.[ ] 7.[ ] Very Necessary

4. How has the overall synchronous learning experience been like for you?

1. [ ] Not Positive 2. [ ] 3. [ ] 4. [ ] Neutral 5.[ ] 6.[ ] 7. [ ] Very Positive

5. Do you think you have more opportunity for interaction with the Instructor and classmates in synchronous learning (compared to classroom learning)?

1. [ ] Least Interaction 2. [ ] 3. [ ] 4. [ ] Neutral 5.[ ] 6.[ ] 7. [ ] Most Interaction

6. Have you found the Instructor's use of Application Sharing beneficial to your learning?

1. [ ] Least Beneficial 2. [ ] 3.[ ] 4. [ ] Neutral 5.[ ] 6.[ ] 7. [ ] Most Beneficial

7. Do you think that 1-hour is sufficient for each synchronous session (i.e. do you prefer it to be longer)?

1. [ ] Not Sufficient 2.[ ] 3.[ ] 4.[ ] Neutral 5.[ ] 6.[ ] 7. [ ] Very Sufficient

8. Do you think that it was necessary to have more synchronous sessions than the seven sessions available?

1. [ ] Not Necessary 2.[ ] 3.[ ] 4.[ ] Neutral 5.[ ] 6.[ ] 7. [ ] Very Necessary

9. Did you find the speed of the campus network sufficient for synchronous learning?

1. [ ] Not Sufficient 2.[ ] 3.[ ] 4.[ ] Neutral 5.[ ] 6.[ ] 7.[ ] Very Sufficient

10. Did you find the recordings of synchronous learning sessions helpful in your study of BUS017 ISB?

1. [ ] Not helpful 2.[ ] 3.[ ] 4.[ ] Neutral 5.[ ] 6.[ ] 7.[ ] Very Helpful

11. Do you think synchronous learning is a useful way to help you study a course such as BUS017 ISB?

1. [ ] Not Useful 2.[ ] 3.[ ] 4. [ ] Neutral 5.[ ] 6.[ ] 7.[ ] Very Useful

12. Do you think it is necessary to provide synchronous learning to other ISB students (i.e. offer it to other classes)?

1. [ ] Not Necessary 2.[ ] 3.[ ] 4.[ ] Neutral 5.[ ] 6.[ ] 7.[ ] Very Necessary

13. Do you think the lab offers a good environment for synchronous learning?

1. [ ] Not Good 2.[ ] 3.[ ] 4.[ ] Neutral 5.[ ] 6.[ ] 7.[ ] Very Good

14. Did you find the Instructor's appearance on video/webcam helpful during the synchronous session?

1. [ ] Not helpful 2.[ ] 3.[ ] 4.[ ] Neutral 5.[ ] 6.[ ] 7.[ ] Very Helpful

15. Please comment on your overall synchronous learning experience, i.e. did you like it, why or why not, etc.? (for more space, please write on the back of this survey form):

_____

APPENDIX F - Interview Questions

Introduction

On behalf of Mr Yeung Sze Kiu, your course instructor and researcher, I would like to thank you for agreeing to participate in this interview. The purpose of this interview is to find out from you your experience of synchronous computer-mediated instruction (synchronous learning) and any feedback you may have regarding any aspects of this kind of teaching and learning practice as conducted by Mr Yeung in the *Information Systems for Business (BUS017)* course that you have just completed recently.

Please feel free to answer the below questions and treat this interview informally. We shall now begin our conversation.

Question 1

As you have recently taken some BUS017 lessons in the lab at SIM University conducted by Mr Yeung in synchronous learning mode, which kind of learning would you prefer: face-to-face in the lecture theatre or synchronous learning in the lab? Why (please explain your reasons as detailed as possible)?

Question 2

If you like synchronous learning, which aspect of synchronous learning do you like the most (i.e. chat, audio, whiteboard, recording or application sharing)? And why is this?

Question 3

If you like synchronous learning, which aspect of synchronous learning do you like the least (i.e. chat, audio, whiteboard, recording or application sharing)? And why is this?

Question 4

If you dislike synchronous learning, please comment why you dislike it (e.g. the system did not work well or it is not easy to use, etc.).

Question 5

Let's turn our conversation to talk about pedagogy (i.e. the practice of teaching and learning). Do you think Mr Yeung's teaching style is suitable for synchronous learning (i.e. the way he teaches via synchronous learning is effective)? Please explain by providing as much details as possible.

Question 6

Which aspect(s) of Mr Yeung's teaching is/are particularly interesting and helpful to you in learning the course (e.g. lab demonstration, lecture, tutorial, presentation, etc.) via synchronous sessions? Please explain by providing as much details as possible.

Question 7

What other ways/styles of teaching do you think Mr Yeung should consider in order to make your synchronous learning experience better (e.g. ask students more questions, provide more examples,

provide more instant feedback, use application sharing more often, conduct exam briefing in synchronous learning, etc)? Please explain.

Question 8

Which topic(s) have you found most suitable and/or effective when learned via synchronous learning (e.g. Topic 2, Lab 2 Website Design, Topic 4, Topic 5, Topic 7, Topic 8 with Access Lab, or Topic 9 or All of them)?

Question 9

Do you think you have more opportunities to participate in discussions with the class in synchronous learning? Yes or No (please provide detailed explanation).

Question 10

Comment on your overall synchronous learning experience and what changes do you suggest would make your synchronous learning experience better (e.g. be allowed to study at home instead of the lab, show videos, show websites, etc., on Blackboard Collaborate)?

Question 11

Now that you have been exposed to synchronous learning, do you think SIM University should provide lessons in this format for more courses (instead of just experimenting it with one class)?

Question 12

Please explain how useful or effective have you found Mr Yeung's use of the video (i.e. that he turned on the webcam and appeared on the video on your computer while conducting the synchronous session). Would you prefer that he turned on the webcam (i.e. do not appeared on video)?

Question 13

How responsive have you found the network in the labs (i.e. did it take long to login and did the whiteboard and/or application sharing load quickly)?

Closing

Thank you for participating in Mr Yeung's research study on synchronous computer-mediated instruction (CMI). Both Mr Yeung and I would like to wish you all the very best in your further studies. Also, Mr Yeung has asked me to inform you that he looks forward to celebrate with you in your DMS graduation ceremony later this year.

--------End of Interview-------

APPENDIX G - Multiple Regression Model

A Multiple Regression analysis comprises the following components:

- Multiple Regression Model ($Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 \ldots b_7X_7$ with Y being the dependent variable, X_i the independent variables)

- Coefficient of Multiple Determination, R^2, and Adjusted R^2 (the proportion of variation in Y that can be explained by X_1, X_2, X_3, $X_4 \ldots X_7$ in the multiple regression model; Adjusted R^2 is an improved version of R^2 in that it takes into consideration the number of independent variables present)

- Global Test of Significance for Multiple Regression Model (an overall test of the model. It tests whether all the regression coefficients (β_i) are equal to zero or the ability of X_1, X_2, X_3, $X_4 \ldots X_7$ in explaining the differences in Y)

- Test of Significance for Individual Regression Coefficients (β_i) (individual tests for X_1, X_2, X_3, $X_4 \ldots X_7$ to determine which independent variable(s) is significant).

APPENDIX H - Backward Multiple Regression for October 2012

Regression Model Adopted

Model 4 (see Appendix I):
$Y = 4.348 + 0.442X_1 - 0.284X_3 – 0.258X_5$
$(Y = a + b_1X_1 + b_3X_3 + b_5X_5)$

Coefficient of Multiple Determination

$R^2_{adj} = 0.341$ indicates 34.1% of variation in Y (learning experience) can be explained by X_1 (Ease of Use), X_3 (Interaction), and X_5 (Duration).

Global Test of Significance

The global test comprises the following Null and Alternative Hypotheses:

H0: $\beta_1 = \beta_3 = \beta_5 = 0$
H1: At least one of the β's is not zero

The F-test was used.

Test Statistic F = 5.142 > Critical Value F(0.05, 3, 21) = 3.070 (obtained from the "F" table).

where the Level of Significance = 0.05;
Degree of Freedom 1 = k = 3 (where k = no. of explanatory variables); and
Degree of Freedom 2 = n – k - 1 = 25 – 4 = 21
and the p-value = 0.008 < 0.05.

Conclusion: sufficient evidence (F = 5.142 > Critical Value 3.070; p-value = 0.008 < 0.05) to reject H0 in favour of H1. It follows that "at least one of the β's is not zero."

Test of Significance for Individual Regression Coefficients (β_i)

Hypothesis tests for each of the three independent variables were conducted to determine which variable(s) is (are) significant. A two-sided t-test was used to determine if a particular coefficient of an independent variable is different from zero.

The three hypothesis tests are:

Ease of Use (X_1)	Interaction (X_3)	Duration (X_5)
H0: $\beta_1 = 0$ H1: $\beta_1 \neq 0$	H0: $\beta_3 = 0$ H1: $\beta_3 \neq 0$	H0: $\beta_5 = 0$ H1: $\beta_5 \neq 0$

The following Test Statistics were obtained:

Ease of Use (X_1)	Interaction (X_3)	Duration (X_5)
Test Statistic t_1 = 3.359 > 2.0796 p-value = 0.003 < 0.025	Test Statistic t_3 = -2.020 > -2.0796 p-value = 0.056 > 0.025	Test Statistic t_5 = -2.651 < -2.0796 p-value = 0.015< 0.025

The decision rule is to reject the Null Hypothesis if -t < -2.0796 or t > 2.0796 (The Critical Value t(0.025, 21) = 2.0595 is obtained from the "t" table) and the p-value < 0.025 (two-sided test).

where the Level of Significance = 0.05 or 0.025 (two-sided test); and
the Degree of Freedom = n – (k+1) = 25 – 4 = 21

Based on the above decision rule, we have the following conclusions:

Ease of Use (X_1)	Interaction (X_3)	Duration (X_5)
Sufficient evidence to reject H0 in favour of H1 (i.e. $\beta_1 \neq 0$)	Insufficient evidence to reject H0 in favour of H1 (i.e. $\beta_3 = 0$)	Sufficient evidence to reject H0 in favour of H1 (i.e. $\beta_5 \neq 0$)

Conclusion: the above individual tests indicate sufficient evidence to reject H0 in favour of H1 for $\beta 1$ (t = 3.359 > 2.0796; p-value = 0.003 < 0.025) and $\beta 5$ (t = -2.651 > 2.0796; p-value = 0.015 < 0.025) (i.e. both $\beta 1$ and β_5 are significant).

APPENDIX I - Backward Multiple Regression SPSS Output for October 2012

Model Summary[f]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.713[a]	.509	.306	.435
2	.713[b]	.509	.345	.423
3	.706[c]	.498	.366	.416
4	.673[d]	.453	.344	.424
5	.651[e]	.423	.341	.424

a. Predictors: (Constant), Video, Audio, Interaction, Duration, Application_Sharing, Frequency, Ease_of_Use

b. Predictors: (Constant), Audio, Interaction, Duration, Application_Sharing, Frequency, Ease_of_Use

c. Predictors: (Constant), Interaction, Duration, Application_Sharing, Frequency, Ease_of_Use

d. Predictors: (Constant), Interaction, Duration, Application_Sharing, Ease_of_Use

e. Predictors: (Constant), Interaction, Duration, Ease_of_Use

f. Dependent Variable: Learning_Experience

ANOVA[f]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.337	7	.477	2.514	.057[a]
	Residual	3.223	17	.190		
	Total	6.560	24			
2	Regression	3.337	6	.556	3.105	.029[b]
	Residual	3.223	18	.179		
	Total	6.560	24			
3	Regression	3.266	5	.653	3.767	.015[c]
	Residual	3.294	19	.173		
	Total	6.560	24			
4	Regression	2.972	4	.743	4.142	.013[d]
	Residual	3.588	20	.179		
	Total	6.560	24			
5	Regression	2.778	3	.926	5.142	.008[e]
	Residual	3.782	21	.180		
	Total	6.560	24			

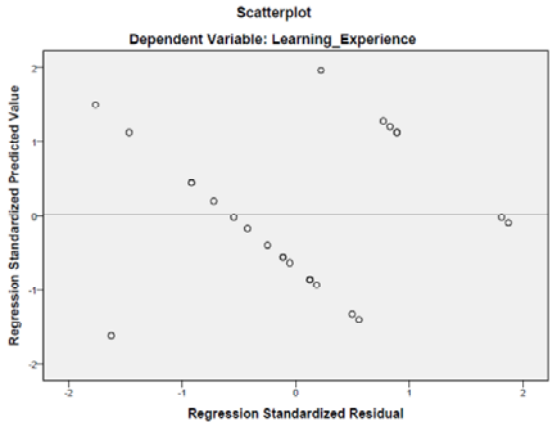
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
5	(Constant)	4.348	.651		6.677	.000
	Ease_of_Use	.442	.132	.660	3.359	.003
	Interaction	-.284	.141	-.412	-2.020	.056
	Duration	-.258	.097	-.466	-2.651	.015

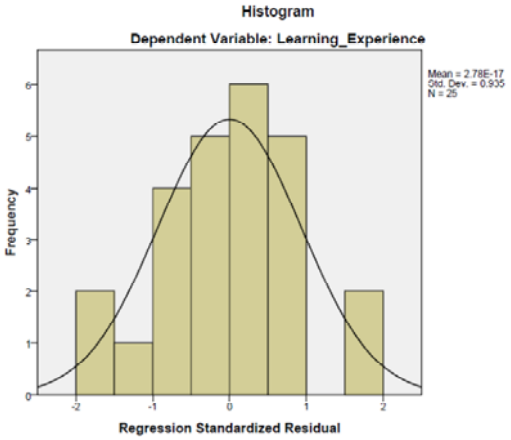
APPENDIX J - Multiple Regression Model Assumptions for October 2012

(i) Linearity and Homoscedasticity (Scattered Plot of Residuals)
(ii) Normality of Residuals (Histogram of Residuals)
(iii) Multicollinearity (VIF value)

Scattered Plot of Residuals



Histogram of Residuals



Multicolinearity (VIF value)

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
5	(Constant)		
	Ease_of_Use	.711	1.407
	Interaction	.659	1.518
	Duration	.888	1.126

The variance inflation factor (VIF) for each variable is 1.407, 1.518 & 1.126, respectively. As it is less than 10 we conclude that X_1, X_3, and X_5 are not highly correlated and that multilinearity is not a concern for this model.

APPENDIX K - Backward Multiple Regression for January 2013

Regression Model Adopted
Model 5 (see Appendix L)
$Y = 1.687 + 0.599X_1 + 0.313X_2 – 0.250X_5$
$(Y = a + b_1X_1 + b_2X_2 + b_5X_5)$

Coefficient of Multiple Determination

$R^2_{adj} = 0.428$ indicates 42.8% of variation in Y (learning experience) can be explained by X_1 (Ease of Use), X_2 (Audio), and X_5 (Duration).

Global Test of Significance

The global test comprises the following Null and Alternative Hypotheses:

H0: $\beta_1 = \beta_2 = \beta_5 = 0$
H1: At least one of the β's is not zero

The F-test was used.

Test Statistic F = 6.238 > Critical Value F(0.05, 3, 18) = 3.160 (obtained from the "F" table).

where the Level of Significance = 0.05;
Degree of Freedom 1 = k = 3 (where k = no. of explanatory variables); and
Degree of Freedom 2 = n – k - 1 = 22 – 4 = 18
and the p-value = 0.004 < 0.05.

Conclusion: sufficient evidence (F = 6.238 > Critical Value 3.160; p-value = 0.004 < 0.05) to reject H0 in favour of H1. It follows that "at least one of the β's is not zero."

Test of Significance for Individual Regression Coefficients (β_i)

Hypothesis tests for each of the three independent variables were conducted to determine which variable(s) is (are) significant. A two-sided t-test was used to determine if a particular coefficient of an independent variable is different from zero.

The three hypothesis tests are:

Ease of Use (X_1)	Audio (X_2)	Duration (X_5)

H0: $\beta_1 = 0$ H1: $\beta_1 \neq 0$	H0: $\beta_2 = 0$ H1: $\beta_2 \neq 0$	H0: $\beta_5 = 0$ H1: $\beta_5 \neq 0$

The following Test Statistics were obtained:

Ease of Use (X_1)	Audio (X_2)	Duration (X_5)
Test Statistic t_1 = 3.688 > 2.1009 p-value = 0.002 < 0.025	Test Statistic t_2 = 1.784 < 2.1009 p-value = 0.091 > 0.025	Test Statistic t_5 = -1.765 > -2.1009 p-value = 0.095 > 0.025

The decision rule is to reject the Null Hypothesis if -t < -2.1009 or t > 2.1009 (Critical Value t(0.025, 18) = 2.1009 is obtained from the "t" table) and the p-value < 0.025 (two-sided test).

where the Level of Significance = 0.05 or 0.025 (two-sided test); and
the Degree of Freedom = n – (k+1) = 22 – 4 = 18

Based on the above decision rule, we have the following conclusions:

Ease of Use (X_1)	Audio (X_2)	Duration (X_5)
Sufficient evidence to reject H0 in favour of H1 (i.e. $\beta_1 \neq 0$)	Insufficient evidence to reject H0 in favour of H1 (i.e. $\beta_2 = 0$)	Insufficient evidence to reject H0 in favour of H1 (i.e. $\beta_5 = 0$)

Conclusion: the above individual tests indicate sufficient evidence to reject H0 in favour of H1 for β1 (t = 3.688 > 2.1009; p-value = 0.002 < 0.025) only (i.e. only β1 is significant).

APPENDIX L - Backward Multiple Regression SPSS Output for January 2013

Model Summary[f]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.764[a]	.584	.376	.897
2	.747[b]	.558	.381	.893
3	.733[c]	.537	.392	.885
4	.724[d]	.525	.413	.870
5	.714[e]	.510	.428	.859

a. Predictors: (Constant), Video, Ease_of_Use, Audio, Duration, Frequency, Interaction, Application_Sharing

b. Predictors: (Constant), Ease_of_Use, Audio, Duration, Frequency, Interaction, Application_Sharing

c. Predictors: (Constant), Ease_of_Use, Audio, Duration, Frequency, Interaction

d. Predictors: (Constant), Ease_of_Use, Audio, Duration, Interaction

e. Predictors: (Constant), Ease_of_Use, Audio, Duration

f. Dependent Variable: Learning_Experience

ANOVA[f]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.821	7	2.260	2.808	.048[a]
	Residual	11.270	14	.805		
	Total	27.091	21			
2	Regression	15.120	6	2.520	3.158	.033[b]
	Residual	11.971	15	.798		
	Total	27.091	21			
3	Regression	14.552	5	2.910	3.713	.020[c]
	Residual	12.539	16	.784		
	Total	27.091	21			
4	Regression	14.214	4	3.553	4.691	.010[d]
	Residual	12.877	17	.757		
	Total	27.091	21			
5	Regression	13.809	3	4.603	6.238	.004[e]
	Residual	13.282	18	.738		
	Total	27.091	21			

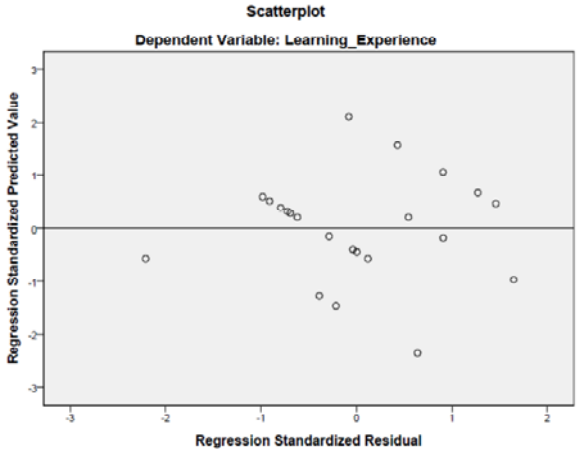
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
5	(Constant)	1.687	1.195		1.412	.175
	Ease_of_Use	.599	.162	.613	3.688	.002
	Audio	.313	.175	.302	1.784	.091
	Duration	-.250	.141	-.299	-1.765	.095

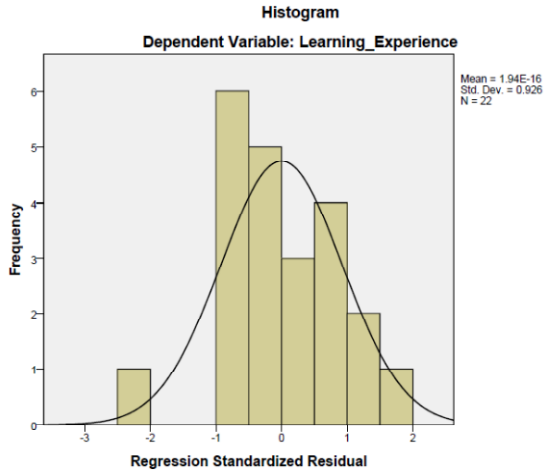
APPENDIX M - Multiple Regression Model Assumptions for January 2013

(i) Linearity and Homoscedasticity (Scattered Plot of Residuals)
(ii) Normality of Residuals (Histogram of Residuals)
(iii) Multicollinearity (VIF value)

Scattered Plot of Residuals



Histogram of Residuals



Multicolinearity (VIF value)

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
5	(Constant)		
	Ease_of_Use	.987	1.013
	Audio	.950	1.053
	Duration	.946	1.057

The variance inflation factor (VIF) for each variable is 1.013, 1.053 & 1.057, respectively. As it is less than 10 we conclude that X_1, X_2, and X_5 are not highly correlated and that multilinearity is not a concern for this model.

APPENDIX N - Backward Multiple Regression for April 2013

Regression Model Adopted
Model 6 (see Appendix O)
$Y = 2.681 + 0.411X_1 + 0.166X_5$
$(Y = a + b_1X_1 + b_5X_5)$

Coefficient of Multiple Determination

$R^2_{adj} = 0.393$ indicates 39.3% of variation in Y (learning experience) can be explained by X_1 (Ease of Use) and X_5 (Duration).

Global Test of Significance

The global test comprises the following Null and Alternative Hypotheses:

H0: $\beta_1 = \beta_5 = 0$
H1: At least one of the β's is not zero

The F-test was used.

Test Statistic F = 7.483 > Critical Value F(0.05, 2, 18) = 3.550 (obtained from the "F" table).

where the Level of Significance = 0.05;
Degree of Freedom 1 = k = 2 (where k = no. of explanatory variables); and
Degree of Freedom 2 = n – k - 1 = 21 – 3 = 18
and the p-value = 0.004 < 0.05.

Conclusion: sufficient evidence (F = 7.483 > Critical Value x.xx; p-value = 0.004 < 0.05) to reject H0 in favour of H1. It follows that "at least one of the β's is not zero."

Test of Significance for Individual Regression Coefficients (β_i)

Hypothesis tests for each of the three independent variables were conducted to determine which variable(s) is (are) significant. A two-sided t-test was used to determine if a particular coefficient of an independent variable is different from zero.

The three hypothesis tests are:

Ease of Use (X_1)	Duration (X_5)
H0: $\beta_1 = 0$ H1: $\beta_1 \neq 0$	H0: $\beta_5 = 0$ H1: $\beta_5 \neq 0$

The following Test Statistics were obtained:

Ease of Use (X_1)	Duration (X_5)
Test Statistic t_1 = 2.888 > 2.1009 p-value = 0.010 < 0.025	Test Statistic t_5 = 1.970 < 2.1009 p-value = 0.064 > 0.025

The decision rule is to reject the Null Hypothesis if t < -2.1009 or t > 2.1009 (Critical Value t(0.025, 18) = 2.1009 is obtained from the "t" table) and the p-value < 0.025 (two-sided test).

where the Level of Significance = 0.05 or 0.025 (two-sided test); and
the Degree of Freedom = n – (k+1) = 21 – 3 = 18

Based on the above decision rule, we have the following conclusions:

Ease of Use (X_1)	Duration (X_5)
Sufficient evidence to reject H0 in favour of H1 (i.e. $\beta_1 \neq 0$)	Insufficient evidence to reject H0 in favour of H1 (i.e. $\beta_5 = 0$)

Conclusion: the above individual tests indicate sufficient evidence to reject H0 in favour of H1 for β1 (t = 2.888 > 2.1009; p-value = 0.010 < 0.025) only (i.e. only β1 is significant).

APPENDIX O - Backward Multiple Regression SPSS Output for April 2013

Model Summary[g]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.715[a]	.511	.247	.750
2	.714[b]	.510	.301	.723
3	.714[c]	.510	.347	.699
4	.703[d]	.495	.368	.687
5	.692[e]	.479	.387	.677
6	.674[f]	.454	.393	.673

a. Predictors: (Constant), Video, Duration, Interaction, Ease_of_Use, Audio, Application_Sharing, Frequency

b. Predictors: (Constant), Video, Duration, Interaction, Ease_of_Use, Audio, Application_Sharing

c. Predictors: (Constant), Video, Duration, Ease_of_Use, Audio, Application_Sharing

d. Predictors: (Constant), Duration, Ease_of_Use, Audio, Application_Sharing

e. Predictors: (Constant), Duration, Ease_of_Use, Application_Sharing

f. Predictors: (Constant), Duration, Ease_of_Use

g. Dependent Variable: Learning_Experience

ANOVA[g]

Model		Sum of Squares	df	Mean Square	F	Sig.
5	Regression	7.159	3	2.386	5.205	.010[e]
	Residual	7.794	17	.458		
	Total	14.952	20			
6	Regression	6.788	2	3.394	7.483	.004[f]
	Residual	8.164	18	.454		
	Total	14.952	20			

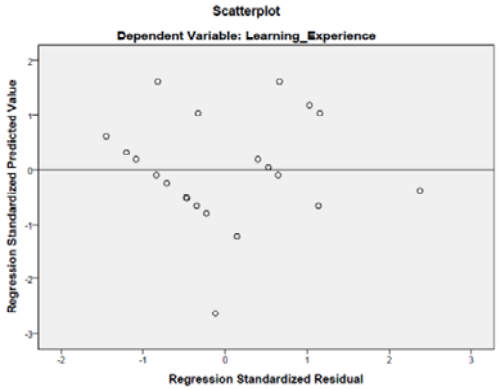
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
6	(Constant)	2.681	.804		3.335	.004
	Ease_of_Use	.411	.142	.513	2.888	.010
	Duration	.166	.084	.350	1.970	.064

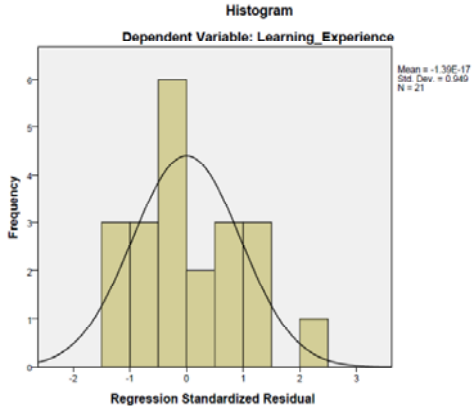
APPENDIX P - Multiple Regression Model Assumptions for April 2013

(i) Linearity and Homoscedasticity (Scattered Plot of Residuals)
(ii) Normality of Residuals (Histogram of Residuals)
(iii) Multicollinearity (VIF value)

Scattered Plot of Residuals



Histogram of Residuals



Multicolinearity (VIF value)

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
6	(Constant)		
	Ease_of_Use	.963	1.038
	Duration	.963	1.038

The variance inflation factor (VIF) for each variable is 1.038 & 1.038, respectively. As it is less than 10 we conclude that X_1 and X_5 are not highly correlated and that multilinearity is not a concern for this model.

APPENDIX Q - Content Analysis - Process

Step 1. Compile the interview transcripts into a single document

Step 2. Identify information units from the transcripts

Step 3. Construct categories

- 3.1 Immersion – close reading of the transcripts
- 3.2 Generate categories – re-reading of each transcript to create a label for each new category (e.g. “lesson recording” from Student 1)
- 3.3 Delete duplicate or redundant categories from transcripts (e.g. “chat” appeared in both Student 1 and Student 7; delete “chat” under Student 7)
- 3.4 Merge common categories into themes (e.g. “Mode of Instruction” from “Blended delivery,” “Home-based synchronous CMI,” and “Lab-based synchronous CMI”)
- 3.5 Assign a number for each theme (e.g. [1] Mode of Instruction)

Step 4. Coding – assign codes to information units on transcripts (e.g. Student 1 - “A mixture of both will keep learning fresh” [1])

Step 6. Sort codes with information units into order (e.g. [1] Mode of Instruction (“I prefer face-to-face learning”) … [13] Instructor appearing on Video (“I prefer to see him on video”)

Step 7. Report on findings according to codes/themes (i.e. final list of categories)

APPENDIX R - Content Analysis - Categories

[1] Mode of Instruction

[2] Synchronous System Functions

[3] Instructional Contents

[4] Instructor's Teaching Presence

[5] Student Learning Experience

[6] Face-to-face Students

[7] Network Issues

[8] Synchronous Learning Offerings

[9] Participatory / Active learning

[10] Communication

[11] Lesson Structure and Organisation

[12] Mobile Devices

[13] Instructor Appearance on Video

[14] Student Learning Issues

APPENDIX S1 - Reflective Journal #1 (October 2012)

Lesson 1 on 2 Oct

Introduction

The October 2012 quarterly semester began on Tue 2 Oct when I conducted the first lesson with a new class (5B) in the course: Information Systems for Business (BUS017). With ethics clearance granted by Athabasca University's (AU) Research Ethics Board (REB), I am able to begin the actual research investigation of my topic: synchronous computer-mediated instruction (CMI) with class 5B. Before reflecting on the process of participant recruitment, it is useful to document the preparation that took place before Lesson #1.

Blackboard Collaborate v11 Licensing

On Fri 21 Sep, after a pause of three months, I re-activated the synchronous web-conferencing system (Blackboard Collaborate v11) chosen for this research study. In previous semesters (Jan12 and Apr12), I had been testing Collaborate in class in order to determine its feasibility. While my ethics application was in-progress with AU between August and September 2012, I did not activate Collaborate for further testing during the last semester (Jul12). In late August, I had a meeting with Blackboard and SIM University's (UniSIM) Educational Technology and Production (ETP) department regarding licensing issues. Basically, my one-year license was coming to an end on 31 August 2012 but my actual research investigation would only begin from 1 October 2012, I would therefore need an extension of my current license. However, as I have already consumed most of my S$10,000 funding for purchasing the initial one-year license of Collaborate, I found myself in an awkward position of running out of budget. As explained in my Research Proposal, ETP is keen to adopt Collaborate for UniSIM but the system that they are currently supporting is WebEx. Fortunately, as part of their planning for 2013, the Director of ETP is supportive of my situation and agreed to fund my license by, initially, extending it for another 12 months. This is a win-win situation in that ETP is able to take advantage of the significant discount of nearly 40% of the total cost that Blackboard gave me for my first-year license. By purchasing an extension of the current license instead of making a separate, new purchase, Blackboard is offering UniSIM the same 40% discount that I have enjoyed in the first year. With the licensing issue settled, I felt relieved and optimistic that as soon as I obtained ethical clearance from AU, I would be all set to “go live” on 1 Oct.

Research Assistant (RA) Recruitment

In my ethics application, I declared that I would recruit a research assistant (RA) to help me with my study. This is necessary in order to “distance” myself from influencing the student-participants especially during the participant-recruitment stage. By mid-September, I appointed two RAs (instead of one) who are students studying at SIM's University of London (UOL)

undergraduate program. These two students were recommended to me by a colleague so I do not know them and therefore we do not have any conflicts of interest working together. Each RA is being paid S$10 per hour according to UniSIM's payment rate for research assistant. The rationale behind appointing two RAs is that in the event that one student could not come into my class because she needs to attend her own UOL lesson then I could call on the second RA as a backup. Furthermore, as I need to conduct my study over four quarterly semesters, I could rotate the work so that each RA has an equal opportunity to be involved in the study by each working for two semesters. I held my first meeting with the two RAs on 17 Sep by explaining to them about my study and the tasks I needed them to assist me in. These include participant recruitment and undertaking surveys and in-depth interviews with the participants at the end of the semester.

Research-study “pre-start” Meeting with RA

I invited one RA back for a “pre-start” meeting on 1 Oct, one day before my first lesson, to finalise the roles and responsibilities based on the workflow (see appendix) that I had drawn up for her. As events have unfolded, I requested both RA to be involved in lesson 1 for participant-recruitment and headset-administration. With the second RA playing a supporting role, the “chief” RA was able to focus on her main task of inviting students to become participants by voluntarily taking part in my study.

Research-study Briefing for Students

In my ethics application, I explained that as the researcher-instructor I should not be involved at all in the recruitment of participants and that this task should be handled fully by the RA. In practice, however, it is difficult to implement because the RA, who is doing this task for the first time, lacks the necessary experience and confidence in conducting a recruitment briefing. For this reason, I conducted the briefing to inform the class about my study. In addition, I also showed a video recording of a test synchronous session that I had recorded a week earlier to give the students a glimpse of Blackboard Collaborate, the web-conferencing system, and what it's like to take part in a synchronous session. Two recorded sessions were shown: (1) a local version (without video) in Java runtime (.jre) format that I had downloaded with Blackboard's Published software, and (2) a hosted version (with video) on Blackboard accessed via a long URL. The second version was particularly useful as I had wanted to show the class Collaborate's video capability because I aim to use the video in the actual synchronous sessions that I plan to conduct starting from Lesson #3. Another reason for showing recordings of Collaborate is I wanted to generate as much interest and enthusiasm as possible among the students so as to help with the recruitment of student-participants by the RAs.

Tasks performed by RAs

As soon as I had completed the briefing, I left the lecture theatre and let the two RA s conduct their tasks of consent-form and headset administrations. Without my presence in the classroom, the two RAs proceeded with the distribution of Letter of Information with Consent Form to all students. For those students who agreed to participate voluntarily in the study, they would complete the Consent Forms and return them to the RAs. In return, the RAs would hand out an USB headset on loan for the duration of the semester to each student-participant who had returned his/her Consent Form. It is in the handling of headsets that two RAs are better than one. The second RA would hold a set of headsets in her hands and whenever the chief RA collects a Consent Form from a participant she simply gets a headset from the second RA and gives it to the participant. When the second RA runs out of headsets, she would run down to the front of the classroom and retrieve another set from the large box that contains 45 headsets. If only one RA was doing this task then it would take much longer and the participants would get impatient because of the long waiting time before getting their headsets. I had discussed with the chief RA in our "pre-start" meeting and decided that it would be better to have the second RA helping her in class.

Another procedure that I had declared in my ethics application is to allow students time to decide on whether or not they would want to participate by letting them submit their consent forms into a drop-box, in their own time before Lesson #2 on 4 Oct, located at Level 2 of the university campus. While this is easy to do, in reality, however, it won't work because students would either forget or ignore this request altogether after they leave the class and attend another lesson. I discussed this situation with the chief RA and we decided that it would be better to take advantage of students' interest and enthusiasm generated during the briefing and let the RA gently seek their voluntary participation after I had left the classroom. We anticipated that if we use the "drop-box" option, the following problems could occur among the students:

- forget about the consent form altogether
- losing the consent form
- do not know where to locate the drop-box
- unable to contact the RA (because she needs to attend her own lessons)
- lose interest because of the above reasons
- unable to recruit sufficient student-participants (i.e. low sample with 10% or less)

Debriefing Meeting with RA

For those undecided students, they have until the second lesson on 4 Oct to submit their Consent Forms to and collect headsets from the RA. At 4pm on 2 Oct, I had a debriefing meeting with the chief RA to reflect on the overall participant-recruitment process so far. To our delight, we counted 29 Consent Forms collected out of a total of 61 students who were present in class. That

is almost 50% participation rate, our target, achieved. I thanked the chief RA for the good work she and her friend had done for me and paid her S$40 for the two hours of work done (she would give S$20 to the second RA on my behalf).

Class Attendance Register

Normally students would register their attendance by scanning the student card against a card-reader at the entrances of the lecture theatre. At the beginning of lesson 1, I asked all students to sign my class register manually also. That was how we (the RAs and I) found out how many students were actually present out of the class of 88 students (88 names are recorded on my class register for 5B).

Lesson #2 on 4 Oct

When the second lesson began at 12pm in LT4.36, I let the chief RA to complete the tasks of (1) collecting the Consent Forms from the remaining participants, and (2) handed out headsets to these participants, before I entered the class. Two more additional participants were recruited by the RA in this lesson, making the total sample of participants as 31. In summary, the Treatment Group now comprises 31 out of 88 students or a recruitment rate of 35% while the Control Group stands at 57 out of 88 students or 65% of the class. After the RA left the class, I thanked all the students for their cooperation and positive response towards my research study regardless of whether or not they are voluntarily participating. In order to sustain the participants' interest in synchronous CMI, I gave the class an Orientation Session on Collaborate by demonstrating the following:

1. Explained about the synchronous session URL:

http://tinyurl.com/BUS017-S0-Oct12

2. Session login as a “student”

3. Test headset in the Audio Wizard for audio input and output

4. How to use Emoticons

5. How to use the Chat Box

6. How to use audio with the “Talk” button

7. Lastly, demonstrating Collaborate's video function by turning on my webcam

To add authenticity into my synchronous sessions, I have decided to use the webcam and to turn on the video in Collaborate. For this reason, it is necessary to use my laptop computer (it has a

webcam) instead of the desktop computer for instructor in the lecture theatre. In previous semesters, I did not use video when I tested Collaborate. As the "student" wireless network in the lecture theatre is not strong, I did tests involving (1) using a personal wireless connection (GPRS) via a wireless-dongle modem, and (2) the "staff" wireless network which only recently became available since August 2012. Given that the "staff" wireless network seems to work better (i.e. higher bandwidth and a more liable wireless-Internet connection), I feel that I am "ready to go" with my first real synchronous session in Lesson #3.

Appendix: Research "Start" Workflow
Lesson 1 on Tue 2 Oct 2012, LT4.36 Block B, 12pm to 3pm

1. Research in Synchronous Computer-mediated Instruction (CMI) – briefing to Class 5B by Research Assistant (after short introduction - 3mins - by Mr Yeung).

2. Mr Yeung leaves LT4.36 immediate after introduction.

3. Research Assistant invite students to participate (aim for 50% of class or 40 to 45 participants)

4. Research Assistant [Naaj] distribute Letter of Information with Consent Form to all students (best to do this by row from bottom to top of Lecture Theatre)
(Participants to complete form)

5. Research Assistant [Naaj & Daveena] to exchange with participants USB Headset with signed Consent Form (i.e. give USB Headset to and collect Consent Form from each Student who decides to become a Participant).
(Naaj collect completed Form from participant and give out USB Headset;
Daveena provide USB Headset to Naaj)

6. Mr Yeung returns to LT4.36

7. Research Assistants [Naaj & Daveena] leave LT4.36.

8. Research Assistant [Naaj] compiles USB Headset Record of Loan

9. Research Assistant [Naaj] to come back in Lesson #2 on 4 Oct to collect consent forms and distribute headsets to the additional, remaining Participants (if any).

<u>Roles & responsibilities</u>
Naaj – Chief RA - look after Consent Form, Letter of Information, and compile USB Headset Record of Loan; return Folder to Mr Yeung

Daveena – Second RA - look after USB Headsets and to support Naaj by providing her with each USB Headset
Naaj & Daveena to meet Mr Yeung at 4pm after class for debriefing

-------- End of Reflective Journal #1 (October 2012) ---------

APPENDIX S2 - Reflective Journal #2 (October 2012)

Lesson 3 on 9 Oct

Yesterday's lesson #3 was the first lesson in which I used synchronous computer-mediated instruction (CMI) to teach Class 5B (i.e. synchronous session #1 took place in this lesson). In addition to my normal lesson preparation of familiarising myself with the course notes, I also setup a test session on Blackboard Collaborate v11, the day before, to test the whiteboard-display of the following course materials in Powerpoint (PPT) format:

(a) Course notes for Topic 2: Computer Hardware – Inside the System Unit
(b) Diagram illustrations
(c) Tutorial 2

While item (a), by default, is already in PPT format, items (b) and (c), on the other hand, are not. They are in Adobe PDF format instead. In previous semesters when I tested Collaborate with my class, I would use the Application Sharing function to display (b) and (c). On this occasion, however, for the real research investigation, I decided not to use Application Sharing because this is only the first synchronous session and I did not want to complicate the situation by showing the participants this function so early in case I encountered technical difficulties (I do not want to risk losing participants' interest in synchronous learning in their first session). As I wanted to give the participants a nice learning experience from the start, I decided to play safe and just used the whiteboard to display all my contents in PPT format. For this reason, I had to convert items (b) and (c) into PPT format and this task took me some time to complete. With the test session completed without problems, I saved items (a), (b), and (c) into a whiteboard file (Whiteboard_8Oct12.wbd) for the actual session.

Following the normal procedure that I have developed from previous semesters, I created, in the morning of 9 Oct, the following Blackboard Collaborate session with a simple link for participants to login:

BUS017 Synchronous Session 1 Tue 9Oct12 11:30am to 3pm

http://tinyurl.com/BUS017-S1-Oct12

Although my actual lesson does not start until 12pm, setting Collaborate to start at 11:30am is necessary as this would give me the extra time to test, for example, the upload of the whiteboard file and testing the login-URL just before class (I could do this from 11am as Collaborate's default settings enable users to login to a session 30 minutes before its starting time). Once these final tests were done, I went to the classroom (LT4.36) with my laptop computer to conduct the teaching according to my presentation plan (see Appendix 1).

For yesterday's lesson, Labs 4.35 were 2.35 are also available. Before the synchronous learning session began, I gave another demonstration to participants to remind them how to start/login Collaborate and how to test their headset-audio. I also brought additional headsets with me in case participants forgot to bring their headsets. As it turned out, two students asked me for the headset. I checked the Loan Register (compiled for me by my Research Assistant after Lesson #1) and was able to confirm the first student's "participant" status (i.e. he has voluntarily opted to participate in the study) and gave his a spare headset. As for the second student, her status is "student" (i.e. she has opted not to participate) so I explained to her that she is ineligible to participate in the study (participant-recruitment closed after Lesson #2 on 4 Oct) and that she should could back to class (LT4.36) after the break. Furthermore, before I send the participants into Lab 2.35, I also informed them of the following points of etiquette:

- raise hand to speak
- respect classmates in chat
- do not shout and use abusive language in chat
- do not exhibit bad behaviour online (i.e. being rude and disruptive)

Thanks to my earlier test experience, I learned to lay down such ground rules at the beginning because in a previous semester, the first synchronous learning session went badly due to students misbehaving on Collaborate (they got too excited with their freedom online and used abusive and bad language to make fun of the occasion) so they had ruined that particular session (these are adolescent students in their late teens and early twenties so this kind of childish behaviour is not unusual).

An error message came up on my laptop computer when I tried to connect to Collaborate. Given that it was shown on the projector-display, I thought "oh no, not now." Fortunately, it worked the second time when I clicked on connect button again. I was so relieved to see myself login to Collaborate as the Moderator. Thereafter, I turned on the webcam and the video came on. At this junction, I told the "participants" to go to Lab 2.35 to login to Collaborate while the rest of the "students" to return back to LT4.36 after the break. The synchronous session started at 1:30pm for both "participants" in Lab 2.35 and "students" (with me) in LT4.36. A "student" in LT4.36 told me that he could not hear me. I explained that this was because I was now using a headset to talk to both "students" (face-to-face) in LT4.36 and "participants" (online) in Lab 2.36 and that I was not using the lecture theatre's audio-microphone. As I cannot "shout" into my headset (my voice would be very loud over the "participants" headset), I invited the "student" to come forward to sit closer in the first two rows of the lecture theatre. Half-way through the synchronous session, another "student" did move forward in order to hear my lesson more clearly.

Initially, only five or six “participants” managed to login by 1:30pm so I waited until 1:35pm to begin the synchronous session. Eventually I was delighted to see all 20 “participants” managed to login. I turned on the recording, welcomed them into Collaborate and praised them for their patience while waiting for the rest to login. With my video turned on, all the “participants” were able to see me visually and it has added a level of authenticity for the audience (both students and participants). Apart from two “participants” encountering audio problem which they eventually sorted out (in fact it was my audio-volume level set to low without me being aware of it that had caused the problem in the first place). With all the “participants” being able to see and hear me, I began the session by continuing with the lecture with illustrations (using PPT display only for all the contents had made the session a successful one) on Topic 2. We also did a Tutorial 2 together. The difference in the audience’s reaction to synchronous learning was immediately noticeable. While there was no difference in the way the “students” were learning passively face-to-face in class, the “participants,” on the other hand, were lively in their “chat” participation. Many would readily type answers in the chat box to the questions that I had posed to the class.

After the session was over, I sent the “students” to work on their assignment in Lab 4.35 while I went to see the “participants” in Lab 2.35 to give them a debrief. While I thanked them for their participation and I could sense their interest and enthusiasm in this kind of learning. I ended the lesson by showing them the following link to the video recording of their very first synchronous session:

http://tinyurl.com/BUS017-R1-Oct12

All in all, the first synchronous session was a success and I am particularly pleased with the preparation that I ha d put in and the way I had conducted the session with plenty of content and social interactions.

-------- End of Reflective Journal #2 (October 2012) ---------

APPENDIX S3 - Reflective Journal #3 (October 2012)

Lesson 5 on 16 Oct

Lesson #5 is the second full-lab session (Lab #2) for all students in Class 5B. The activity that I have identified for synchronous learning is about website design based on table with frames. Usually, in face-to-face mode, I would show the first group of students how to use Microsoft Expression Web 3 to create the webpage (see appendix 1) in one lab and then repeat my demonstration to the remaining students in another lab (because of class-size problem, two labs located on different floors are used in order to accommodate all the students from one class). With synchronous learning, this physical classroom-constraint problem is neatly solved via a virtual session on Blackboard Collaborate. Before I reflect on the synchronous session itself (about doing application sharing for the first time this semester), it is useful to document the preparation that took place prior to Lesson #5.

From my experience of using Application Sharing on Blackboard Collaborate, I recall the "black box" problem appearing on users' screens. Basically, this is due to the appearance of the instructor/moderator's dialog window (chat box and image/video box – i.e. my dialog box) hovering on top of the shared application. On each individual user's screen, "my dialog" box simply appears as a black box. In order to get rid of the "black box" on users' screens, I would need to minimise "my dialog" box. However, if I minimise "my dialog" box, I would not be able to see my own chat box and hence I would miss out on the messages or questions from students. Previously, I would inform students about this problem first before minimising "my dialog" box and occasionally I would bring it back to see the chat messages. While this is not an ideal solution, at least students' screens would not be blocked by a "black box" on top of the shared application from my computer.

Fortunately, the timing of my first "application sharing" synchronous session is good. Last week, on 12 Oct, Mr Stephen Rowe of Australia's Southern Cross University (SCU), came to see me at SIM University. He had come to Singapore at the invitation of Blackboard to participate as a Guest Speaker in their Blackboard Forum which took place on 11 Oct 2012. I first met Mr Rowe in Hong Kong when we participated together in the Blackboard Forum 2011 and we have since been keeping in regular contact on our common topic of interest: Blackboard Collaborate and synchronous learning. Mr Rowe uses Collaborate in his teaching on a regular basis at SCU so he has good experience with Collaborate.

I discussed the "black box" problem with Mr Rowe as we explored a test Collaborate session together in my office on 12 Oct. He advised me to limit the screen size of the application that I intend to share to within the size of the whiteboard. I tried this out and it worked perfectly. Importantly, I now understand the nature of the "black box" problem which is caused by overlapping windows (i.e. between my dialog box and the shared application). I was delighted to

have found the solution just-in-time before Lesson #5. Another useful tip I learned from Mr Rowe is how to display/upload contents onto the whiteboard other than Microsoft Powerpoint (PPT) files. As I have been somewhat frustrated by Collaborate's limitation of showing PPT files only on its whiteboard (i.e. PDF files are not "uploadable" unlike in Adobe Connect), I discussed with Mr Rowe about this limitation. He showed me the "camera-paste-image" option as an alternative to displaying contents on the whiteboard. Now, thanks to Mr Rowe's advice, I've figured out how to display PDF or any other contents on Collaborate's whiteboard instead of the need to convert them into PPT files (a slow and clumsy method) all the time.

As for the actual synchronous session (#2) itself, that went rather well without major technical problems. After I had delivered the first part of Lesson #5 with Class 5B in the lecture theatre, I told the "face-to-face" students (i.e. students not participating in my study) to go to Lab 3.35 while "synchronous" students (i.e. the participants) go to Lab 2.25. I also went to Lab 3.35 together with the "face-to-face" students. One common problem that participants faced was that some of them had forgotten to bring their headsets despite my reminder message on the course-tutorial website. In last week's synchronous session #1, only one participant forgot to bring his/her headset but yesterday there were eight participants without headsets. I happened to have eight spare headsets for them to borrow.

By 1:15pm, my laptop computer was connected onto the lab's AV system with the screen projected onto the big whiteboard. My wireless-Internet connection with the Collaborate Session also worked after the second login attempt (ideally I should be using a wired connection but this isn't available so this is my only option). After testing my audio and video with the participants, I turned on the recording to begin the session. The application sharing of Microsoft Expression Web 3 from my laptop computer onto the participants' screens also worked well. One discerning participant asked on the Chat about the shared application being cropped. I explained via my audio that this is because I'm fitting it within the whiteboard window. Another student could not get her audio working. I told her to re-test audio but she solved the problem later by re-login from another computer. My demonstration of website design using table with frames in Expression Web was interrupted when a couple of "face-to-face" students also login to the Collaborate session with their computers' external speakers switched on. This made me hear my own echo so I paused the session and asked them to turn off their speakers and logout from the session. In the first instance, they were not supposed to attend the synchronous session anyway but they did because they knew the following login hyperlink:

http://tinyurl.com/BUS017-S2-Oct12

The next time I conduct a synchronous session in the lab, I will remember to remind the "face-to-face" students not to login to Collaborate.

In terms of interaction, I observed that the participants performed better than their "student" counterparts. While the "face-to-face" students simply watched my demonstration on the big whiteboard passively, the participants were responding on the Chat to my question of how to create a second webpage based on the table-with-frames template that I had just created on the first webpage. Once I had completed the demonstration, I stopped sharing Expression Web and then shared Firefox to show the participants (and students) the outcome of this lab activity. This also worked well so I am happy to conclude that application sharing has been a success when I used this feature for the first time this semester in synchronous session #2 of Lesson #5.

The above sequences of events are captured in the following recording:

http://tinyurl.com/BUS017-R2-Oct12

-------- End of Reflective Journal #3 (October 2012) ---------

APPENDIX S4 - Reflective Journal #4 (October 2012)

Lesson 6 on 18 Oct

Today's synchronous session #3 did not go well. While it was not exactly a disaster, I am frustrated and disappointed for the students. The problem is not technical but institutional. What happened was the two labs (Lab2.35 & 4.35) scheduled for my lesson today were shut. I was upset but I kept calm and apologised to my class.

This problem happened because the Facility Department did not schedule my lesson in these two labs between 12pm to 3pm even though it exists on my timetable as well as on the students' timetable. For whatever reason, Facility did not get the booking request from the Administration Department which is responsible for timetabling and classroom-resource allocation.

After my lesson was over at 3pm, I went to Lab 4.35 to see for myself the problem. The electronic board (e-board) outside the lab did not show my lesson booking. While the doors were open, the air-conditioning system was not turned on so it would be too hot and stuffy to ask the participants to use this lab. The doors to Lab 2.35 were shut altogether without my lesson booking displayed on its outside e-board.

Without labs, I had no choice but to recall the participants back to the lecture theatre (LT). Valuable time was lost as a result but before I realised this problem (a student in the LT told me after she received a call from her "participant" classmate), I was wondering how come no participants managed to login to the synchronous session after they had gone to Lab2.35 almost 15minutes ago.

With most students back in the LT, I turned on the recording and conducted a tutorial (the second part) on today's topic 4 (system and application software) with participants (and students) present in the LT instead of in the Blackboard Collaborate virtual classroom. Given the prior preparation that I had put in to today’s synchronous session, rather than cancelling it, I went ahead with the recording in order to give participants the opportunity for reviewing their learning on topic 4 later. However, it was difficult to maintain the class’s attention after the earlier disruption and I almost lost my patience with the students with their talking instead of paying attention to the tutorial discussion.

In my test session earlier in the morning, I was planning to conduct both part 1 and 2 of today’s tutorial via synchronous learning. I even tested the upload of three PPT files comprising more than 70 pages of course materials including the two tutorial files that I had previously converted from PDF into PPT. The purpose was to test Collaborate’s file-upload capacity and then to save the bundled PPTs into a “whiteboard” file. However, as I was running late with time, I decided to conduct tutorial part 1 face-to-face in class first before sending the participants into Lab2.35. This turned out to be a good decision given the problem of non-availability of labs that we faced today.

Despite the chaos in the classroom (LT) because of the above disruption and the students’ lack of

attention and interest with tutorial part 2 (I nearly lost control of the class during the recording), an unexpected incident happened. One participant managed to login to the synchronous session and his presence on Collaborate caught all of us by surprise (including me) and suddenly everyone in the classroom concentrated on the big screen showing Collaborate. I seized on this moment of students' total attention by acknowledging this participant's presence and asked him from where he had login. He told us on the chat: Lab 3.35. Amazing. I praised this participant for taking the initiative to "think out of the box" and login from another lab. I even joked with the class that he must have got bored with being in the classroom and decided to take matters into his own hands and found somewhere to attend the synchronous session instead. Before I continued with the tutorial (part 2) discussion, another participant also login. Wonderful. Thanks to these two enthusiastic participants, synchronous session #3 did not ended in a disaster after all and everybody, myself included, took away some nice interactive learning experience together both face-to-face and synchronously.

I have already sent an urgent e-mail to the Administration Department to investigate the above lab-scheduling error. For my next week's synchronous session #4 on 23 Oct, I must check that the labs are available before the start of Lesson #7.

---------- End of Reflective Journal #4 (October 2012) ----------

APPENDIX S5 - Reflective Journal #5 (October 2012)

Lesson 7 on 23 Oct

Yesterday's synchronous session 4 went well. The labs were available so participants did not encounter the frustration of unable to get into Lab2.35. The problem with the last lesson (#6 on 18 Oct) was due to the wrong lab given to me and the students by the Administration Department. We were supposed to use Lab3.35 but our timetable shows Lab2.35. I found out about this erroneous-lab problem after checking with Administration while investigating the problem. To ensure that yesterday's Lab2.35 was indeed available, I went to this lab to check on its e-board before the start of my lesson.

One problem that I have learned from lesson #6 is to use the class-time (3 hours) more efficiently. Because I had scheduled the last synchronous session for doing tutorial 4 activities only, I did not sent the participants to the lab until I have concluded the lecture on topic 4 (system & application software) in the usual face-to-face mode. By then it was just after 2pm with less than an hour of class-time remaining. Given that the participants would normally need about 15mins to go to the lab, switch on their computers and login to Blackboard Collaborate, much time would be lost even if they could access Lab2.35 in the first instance. The problem was compounded by a lack of access to Lab2.35 and by the time all the participants returned to the lecture theatre, it was almost 2:30pm and I only had 30mins left to "catch up" on tutorial 4. Fortunately, I did the first part of tutorial 4 before sending the participants to Lab2.35 for synchronous learning to which they did not have access.

Rather than letting the participants go to Lab2.35 during lesson-time, I scheduled yesterday's lesson better by using the break for them to login to synchronous session #4. However, a mistake I made in yesterday's lesson was not informing the class to come back to the lecture theatre (for the students) or lab (the participants) by a specific time (e.g. 1:30pm) after the break which usually takes place between 1pm to 1:30pm after one hour of lesson has been completed. The class cleverly took advantage of my mistake and did not return to the lecture theatre or login to Blackboard Collaborate until 1:35pm. No wonder nobody managed to login after I had login to Collaborate around 1:15pm. Thinking that there might be Internet-access problems (i.e the URL I had set could be wrong), I tested the following session link:

http://tinyurl.com/BUS017-S4-Oct12

by login on another computer (the Instructor computer in the lecture theatre [I was using my notebook computer with webcam for my own Moderator login]) as a participant under the name of "Kai Kai." From a pedagogy perspective, I think this is an example of connecting with the class via social presence. Let me explain. "Kai Kai" is one of two pandas (along with "Jia Jia") recently arrived in Singapore for their 10-year stay from China. At the time of Kai Kai's arrival in late September 2012, it coincided with my testing of Blackboard Collaborate and it just came naturally to me to use "Kai Kai" as the "student" login on my second computer while I login as the moderator under "Mr Yeung" on my notebook computer with a webcam. I subsequently told the class about Kai Kai and showed them a picture of this panda. They were delighted to hear the

story of Kai Kai and I have since used him as my "student" test-login name. To begin the session, on this occasion, I told the participants that "we have a special guest, my buddy Kai Kai, joining us in this synchronous session."

Overall, I conducted the second part of the lecture on topic 5 (computer networking) followed by two interactive tutorials in synchronous session #5. It lasted almost 50mins with questions and answers from both the students in class and the participants in the lab. As I needed to be in a fixed position (instead of moving around when I conduct the lecture) in order to appear on the webcam, I found that I had to focus more on the contents (as displayed on Collaborate's whiteboard) instead of being distracted by students' attention of their lack of attention in the classroom. As a result, I felt that I was able to present the second half of lesson better especially the dialogue that I created with the class while we did the interactive tutorials together. That's what I found when I reviewed the recording of synchronous session #4:

http://tinyurl.com/BUS017-R4-Oct12

---------- End of Reflective Journal #5 (October 2012) ----------

APPENDIX S6 - Reflective Journal #6 (October 2012)

Lesson 9 on 30 Oct

I should get an award for "pulling off" today's synchronous session #5. I encountered all sorts of technical problems during testing and I'm glad that the actual session, in fact, went smoothly against all the odds (i.e. it was not supposed to work). Let me explain. The weekend break was longer than usual because last Friday (26 Oct12) was a Public Holiday (Hari Raya Haji) in Singapore. Yesterday, Monday (29 Oct), the university's Internet connection broke down for most of the day. I did not know about this problem because there was no announcement about Internet failure other than me experiencing very slow or no connection on my wired desktop and no connection at all using wireless on my laptop computer. I reported the problem to our IT Service Desk.

The 1st test session I did yesterday for synchronous session #5, I encountered the following problems:

- Could not access Blackboard Collaborate to create to create the test session at all (because of no Internet).
- Used my own 1.5Mbps GPRS (wireless dongle) Internet connection instead to create the test session but unable to upload Powerpoint (PPT) files on my laptop computer (this is an on-going problem – i.e. PPT files cannot be uploaded to Collaborate from my laptop).
- The test that I'd planned involved creating a Whiteboard (WDB) file comprising: (1) Topic 7 Learning Summary, (2) Tutorial 7a, & (3) Tutorial 7b but only item (1) was created because (2) & (3) are PPT files that could not be uploaded.
- Topic 7 Learning Summary is a Word document and I used Collaborate's "camera/paste" capture method to display this one-page table on the Whiteboard (this is a real time-saver – thanks to Mr Stephen Rowe – see Journal #3) to review this topic synchronously with the class (students & participants). Topic 7 (Computer Ethics & Security) is a large and difficult topic for students to grasp the many new and difficult concepts and I found that having a one-page summary helps with students' learning so I decided to review this topic over a recorded synchronous session but my WDB file was not complete (i.e. without items [2] & [3]).

In this morning's 2nd test, the following problems occurred:

- Unreliable wireless Internet - the Internet appeared to be back to normal after yesterday's disruption. Wireless was also available. Used wireless laptop to login Blackboard Collaborate to create Session 5 Test 2. While System Administration Session (SAS) login was fine, I experienced connection failure when I clicked on Collaborate's Default Settings before Schedule (the) Meeting. Clicking on the "Back" button got me back into Default but the settings showed "Brazil Time." This happened again when I logout/login Collaborate's SAS to retry Schedule Meeting.

- Instead of using my wireless laptop, I switched over to my wired-desktop computer to

create Session 5 Test 2. This worked so the university's wired Internet is functioning normal today. However, I needed to use my wireless laptop (because of the webcam) so that computer still needed testing. On my wired desktop, I managed to create a new WDB file comprising the above items (1), (2) & (3).

- From my wireless laptop, I login Session 5 Test 2 as Moderator and opened the just-created WDB file and then turned on my webcam. All appeared normal until I login my wired desktop (i.e. the 2nd computer) as "Kai Kai," the participant. To my horror, the Whiteboard contents that are shown on my wireless laptop did not display on Kai Kai's desktop. The "red and yellow dots" indicator showed that Kai Kai's Whiteboard is "delayed" or "slightly delayed." Eventually, the first page containing item (1) appeared on Kai Kai's desktop but when I moved forward to item (2) comprising PPT contents, Kai Kai's Whiteboard simply went blank. I figured that this was due to an unreliable wireless Internet connection so I cannot rely on today's poor wireless for the actual synchronous session.

- I activated "Plan B" by abandoning the university wireless and used my own 1.5M wireless GPRS connection instead. It worked better than the university wireless link but my laptop's webcam failed when I re-started it a second time. I was not worry about my webcam failure because a reboot of my laptop would get it re-started again. Importantly, using my own wireless GPRS connection, Kai Kai's Whiteboard could display all the contents despite some momentary delays.

- I felt frustrated with so many different testing problems but I was confident that the real synchronous session #5 would work later in the afternoon.

During the actual synchronous session, my laptop's webcam worked despite login as Moderator using my own wireless GPRS Internet connection. The Whiteboard also worked, apart from one or two participants' initial delays (as shown on their "red/yellow dots" indicators). At a pedagogical level, the 15 participants who login from Lab (2.35) were interactive and engaging as they asked me lots of questions on the Chat. Another unique sight was the group of students who remained in class to continue with my lesson in face-to-face mode. These students actually became more attentive with good concentration when I discussed today's learning item (1): Topic 7 Learning Summary, synchronously with the participants. There was insufficient time to cover items (2) & (3) but I noted that the Whiteboard was working fine for the participants. Despite the above problems, I am delighted that I have managed to "pull off" today's synchronous session #5 against the odds and gave the class a continuous, interruption-free learning experience. That's why I began today's reflective journal #6 by saying "I should get an award for……" It is the satisfaction of knowing that the system is not supposed to work (because of unreliable wireless connection at the university) but I have made it worked today and that pleases me the most. The evidence is captured in the following recording:

http://tinyurl.com/BUS017-R5-Oct12

---------- End of Reflective Journal #6 (October 2012) ----------

APPENDIX S7 - Reflective Journal #7 (October 2012)

Lesson 11 on 6 Nov

Over an hour of synchronous computer-mediated instruction (CMI) was presented in yesterday's synchronous session #6 covering the following activities:

1. Feedback on students' assignments
2. Lecture on Topic 8 Database Management System (part 2)
3. Database exercise demonstration
4. Tutorial on Topic 8

The learning focus of the whole class was very good as I observed directly the change in students' learning behaviour in the second half of the lesson when I delivered it through synchronous CMI. This was remarkable and I was delighted to witness firsthand the joy of teaching and learning when students concentrated so well in class and it was such a stark contrast to the first half of the lesson.

As usual, in face-to-face teaching, students in the classroom would be distracted by the noises of other students talking to each other and in a large class of 40-50 students, it is always difficult for every single student to pay attention to the lesson all the same time no matter how interesting the topic is. It also doesn't help when the instructor's (i.e. me) teaching momentum and thinking are disrupted (because of the noise). The lack of flow and continuity in an instructor's presentation also contributed to students' loss of interest and attention, I observed. That is just the nature of face-to-face classroom teaching.

When we began synchronous CMI in part 2 of yesterday's lesson with the participants login to Blackboard Collaborate in the lab, I was not planning to deliver item (1) above using Application Sharing. In fact this item was supposed to have been completed in face-to-face mode before the class broke up for their lesson-break. However, because Word 2007 crashed on my laptop computer after I gave my feedback to Group 10 (there are altogether 15 groups of students who have completed their in-course assignments), I had no choice but to continue in part 2 via synchronous CMI mode. In fact, when I shared my Word 2007 via Collaborate it worked rather well despite an initial delay of the Whiteboard on some students' computers. Students' attention on the feedback I gave for the remaining groups (11, 12, 13, 14 & 15) was very good. Those in the classroom were listening to my feedback for the participants in the lab with interest and good concentration while the participants were in a focused mode of learning. The only pedagogical problem I noticed was the rather lengthy lecture I had to deliver for item (2).

As for item (3), the Access application that I shared across the participants' computers went very well despite some initial delays due to my limited wireless 1.5M GPRS connection (the university wireless network was still giving me problems so I continued to use my own wireless

modem). The actual lab exercise was quite long involving five questions so I customised the demonstration by focusing on two questions (relating to database report and query) after showing the class how to create the initial database table with data.

By the time I reached item (4), I simply let the students took responsibility for their own learning by asking them to discuss and share with the class the tutorial questions. Those students who were present with me in the classroom in face-to-face mode shared their answers with the participants via me (I had to convey their answers to those in the lab) while the participants' comments and answers via the chat were shown to everyone on the big screen. These good learning moments that I observed came about due to the reciprocal behaviour of both groups of students (i.e. the experimental group in the lab using synchronous CMI affected the control group in the classroom and vice- versa). On my part, I facilitated the learning through my teaching and social presence.

Whether or not it was because of the fact that the end of the semester is coming soon (next week is the last week of lessons), all students left yesterday's Lesson 11 feeling happy while achieving a positive learning experience, I observed, thanks largely to the availability of synchronous learning. From my perspective, I have no doubt about the positive impact that synchronous CMI is playing in positively influencing students' learning experience.

The two tests that I conducted before yesterday's lesson were crucial in enabling me to understand the performance of Collaborate under the limited-bandwidth environment within which I was operating and, as a result, the actual synchronous session #6 went smoothly despite the following problems encountered during testing:

1. Application-Sharing delay on participant's computer due to slow/unreliable campus wireless network

2. System administration session (SAS) showed Brazil time when I tried to create a test session - again, due to slow/unreliable wireless

Nevertheless, I still managed to build up a large whiteboard (WDB) file comprising the following:

a) Powerpoint (PPT) upload for Topic 8

b) Lesson 11 Plan (Word document) via camera/capture

c) Access Lab Exercise (Word document) via camera/capture

d) Tutorial 8 (PDF document) via camera/capture

I find Collaborate's Whiteboard-file (WDB) function particularly neat and useful as it encapsulates all the lesson's contents (i.e. items "a" to "d" above) into a single file instead of requiring the instructor to upload them individually during the synchronous session. In short, the

WDB function provides a "container" for the instructor to plan his/her lesson properly and this is a very good pedagogical practice for the synchronous environment.

The recording of Synchronous Session #6 is available on:

http://tinyurl.com/BUS017-R6-Oct12

---------- End of Reflective Journal #7 (October 2012) ----------

APPENDIX S8 - Reflective Journal #8 (October 2012)

Lesson 12 on 8 Nov

Yesterday's synchronous session #7 is the last session of the October 2012 semester. I conducted the following activities with Class 5B in Lesson 12 (part 2) via Blackboard Collaborate:

1. Lecture on Topic 9 Systems, Analyses and Design (part 2)

2. Assignment reflection by participants

The Whiteboard file used for this session comprised the following items:

a) Powerpoint (PPT) upload of Topic 9

b) Case Study (PDF) of Hong Kong International Airport via camera/capture

c) Extracts of 15 student-group reports (Word) via camera/capture

Topic 9 is a theoretical topic with lots of details for students to learn especially on the part that covers System Development Life Cycle (SDLC), a popular methodology that guides the developmental process of information systems by System Analysts.

To help students connect the theoretical principles with real-work problems, I used a case study about the Hong Kong International Airport (HKIA) to highlight the issues and risks of system conversion as part of the discussion of SDLC Phase 4 (Testing and Implementation). Previously, in face-to-face mode, I would show the PDF document of HKIA and discussed with the class the decisions taken by the Hong Kong Airport Authority to shut down the old airport at Kai Tak and to open the new airport at Chek Lap Kong simultaneously on the same day (6 July 1998). Regarding information systems conversion, the HKIA performed what is known as a Direct or Crash Conversion which, while achieving a high level of operational efficiency, carried the highest level of risks as shown in the failure of its Flight Information Display (FID) and other systems installed at the new airport. It took HKIA over six months to recover from the reputational and financial damages incurred as a result of this kind of system conversion. Airports are exciting places so this particular case study is an interesting example for engaging students in an otherwise theoretical topic.

In synchronous computer-mediated instructional (CMI) mode, the equivalent PDF document could be application-shared across participants' computers but given my limited wireless 1.5Mbps connection, I did not want to do application sharing even though it would work from my experience of synchronous session #6 (see Reflective Journal 7). Instead I used Blackboard Collaborate's camera/capture to extract the key sections of the case study and embedded them onto the Whiteboard. The actual presentation of the case study went very well on Collaborate as it was quite intuitive to switch from one page of the PPT course notes on the Whiteboard to the pages of the HKIA case study. Most importantly, the contents displayed quickly on the

participants' computers with only minimal whiteboard delays. The reason why I could "see" the participants' computers was because I used the instructor-desktop computer (without webcam) to login as "Kai Kai," the guest-participant while using my laptop computer to conduct the synchronous session as the Moderator. Making use of the desktop computer enabled me to monitor closely the response of the participants' computers and it gave me the reassurance that my lesson-transmission was functioning normally. If I was operating in a normal, wired-broadband environment, I wouldn't have to worry about my laptop computer's transmission-latency.

Item (c) was the most interesting part of the session and it was fitting that I decided to do this in the last synchronous session because the participants have become used to the Collaborate learning environment by now. It involved each participant using the audio to speak about their learning experience in the group-project (website design) that they have completed earlier. Given their lack of confidence in using the audio, I knew beforehand that if I were just to put them on the spot and asked them to use the audio, they would have nothing to say other than "hello" or "can you hear me?". Instead, I did some prior preparation in order to help the participants on audio. I extracted the section on "learning experience" that they wrote from all the 15 group-reports and used Collaborate's camera/capture to embed them onto the Whiteboard.

To prepare for this audio-activity, some system setup adjustments were necessary in Collaborate including (1) switching to enable two talkers to talk simultaneously, and (2) changing the audio output on my laptop computer to connect with the loud speakers of the lecture theatre. Regarding setup (1), Collaborate's default setting is for single-talker only. What this means is that only one person can talk at any one time when he/she presses the "Talk" button. If another person wants to talk then he/she must wait until the first person releases the audio by unpressing "Talk." In all the previous sessions I usually used audio for most of the time as the participants have tended to prefer to use text-chat to communicate with everyone. As the Moderator, I can force-release the "Talk" button if someone is holding onto it without releasing but I have not tried this before in an actual session.

If I left the default, single-talker setting unchanged on Collaborate I anticipated problems would occur in that a participant may forget to release "Talk" after using audio (because he/she is too nervous for being "put on the spot") and that I would have to do a "force-release." I worried that the session's flow would be disrupted and that the participants would not have a good learning experience if I have to constantly force-release the "Talk" button that is occupied by a participant. For this reason, I decided to change Collaborate's default setting to enable "2" talkers talking simultaneously.

As for setup (2), Blackboard Collaborate's audio wizard enables the audio output from my computer to be connected to the Lecture Theatre's loud speakers so that the students who are with me in the classroom could hear the participant's audio that is broadcasted through my laptop computer even though my headset is connected to it. This is a great feature of Collabrate: the flexibility to enable a user (i.e. me) to set the audio output to either one of two sources: (a) the headset that is plugged in to the laptop computer (i.e. my headset) or (b) the external speakers that are connected to my computer's audio output. My default audio-output setting is normally

set to source (a) but on this occasion I switched to (b) instead. As for my audio-input, that remained unchanged in that it was set to my headset so that the participants could hear me on their headsets. Testing was not required for the switching of audio-output from source (a) to (b) because I have done this before when I demonstrated Blackboard Collaborate live to my university's faculty colleagues earlier this year.

When I invited the first participant to talk about his assignment learning experience, I moved the Whiteboard forward to show the summary extract of his group's report and it enabled him to read the report out for everyone (participants on headsets and the students and me on loud speakers in the classroom) to hear. I thanked the first participant for his good audio-presentation effort but I explained to him that it would have been better if he had tried to comment on his learning experience based on the contents of his group's report. The rest of the participants understood my request and they gave the class good audio-accounts of their assignment-learning experience. One participant, Jeky, spoke about how much he liked learning in the synchronous sessions. I was somewhat surprised but delighted with his response. The two-talker option that I had enabled made the conversation between me and the participant holding the "Talk" button flow freely and I actively encouraged each participant to express himself/herself freely on audio.

In conclusion, as I reflect on yesterday's final synchronous session with satisfaction, the key pedagogical principle that I managed to put into practice is to actively engage the participants through encouragement, support and empathy so as to create a safe learning environment in which they could thrive in their own reflective learning.

The recording of synchronous session #7 is available on:

http://tinyurl.com/BUS017-R7-Oct12

--------End of Reflective Journal #8 (October 2013) --------

APPENDIX T1 - Reflective Journal #1 (January 2013)

Lesson 1 on 3 Jan

The new semester (Jan13) began yesterday and my first lesson for the Information Systems for Business (BUS017) course with Class 5B took place earlier today, Thu 3 January 2013, between 12pm to 3pm. My class register shows a total of 63 students registered in my class but the actual attendance today is 46. Some of the remaining 17 absentees should turn up in next lesson on Tue 8 Jan13. My timetable shows today's lesson 1 being a lab-session so I have planned it accordingly to consist the following activities: (1) course introduction and presentation of topic 1, (2) synchronous CMI orientation, (3) briefing of research study by my research assistant (RA), and (4) lab exercise.

I conducted activity (2) after the students came back refreshed from their break at around 1:40pm. Being an orientation session, I named it as "Session 0" with the following login link:

http://tinyurl.com/BUS017-S0-Jan13

From January 2013 onwards SIM University's Educational Technology Production (ETP) will offer Blackboard Collaborate v12 to faculty members the option of using this synchronous web-conferencing system for teaching. I assisted the ETP department, which took over the ownership of the 500-user software license, by transferring over to them the License Agreement which includes Administration Login details and other technical-support documents. As it was the ETP department which had earlier paid for the renewal of license for the second year (from 1 September 2012 to 31 August 2013), they effectively have taken over the ownership of Collaborate from me. This arrangement suits me find (as explained in my Reflective Journal #1 of last semester, October 2012) because I have used up most of my research funding and I would need to seek for additional funding for the renewal of Blackboard Collaborate. As part of their preparation to roll-role Collaborate to the UniSIM faculty, ETP introduced two guidelines on how the system should be used: (1) that version 12 should be used instead of 11, and (2) that Collaborate should be integrated with UniSIM's Blackboard Learning Management System (LMS). While I have changed to v12 beginning with today's orientation session, ETP gave me the flexibility not to use the Blackboard LMS for session creation and other system activities (e.g. recording, etc.). I personally find the integration of Collaborate with Blackboard LMS adds an additional layer of complexity to how the system should be used so I have opted to continue to use it the way I have done (i.e. create sessions directly within Collaborate). Thankfully, ETP allowed me this flexibility otherwise I would need to change the session-creation and testing procedures that I have developed.

Prior to today's orientation session, two test sessions were conducted on 27 Dec12 and 2 Jan13, respectively, to test Blackboard Collaborate's following functions: (i) camera capture of Word & Excel contents to Whiteboard, (ii) Powerpoint file upload, (iii) Video, (iv) Emoticons & Chat, and (v) Whiteboard file comprising items (i) & (ii). Both tests were conducted with my own wireless cellular connection and the Internet connection speed was sufficient and better than the University's wireless network. Initially I did not plan to turn on/use the recording but I am glad I did during the actual orientation.

As for the actual orientation session itself conducted at the lecture theatre, it went better than I had expected thanks to the availability of wired Internet connection for laptop computers for the first time. When I arrived at the lecture theatre, I noticed an additional new network cable so I just plugged it into my laptop computer and the Internet connection was activated instantly. The speed of the connection was also good so that gave me the confidence to use the University's network instead of my own wireless-cellular connection as I have done during last semester.

After I completed the demonstration to show the students how the basic functions of Blackboard Collaborate worked including login and audio testing, I left the lecture theatre and to allow the RA to conduct (a) a briefing about the research study, (b) the recruitment of participants, and (c) the distribution of Information Letters, Consent Forms and Headsets to participants. Out of a total of 46 students present, 22 agreed to participate in the study. After the RA completed her above tasks, I returned to the lecture theatre to thank all students for the positive interest that they have shown in the research study and especially to those who have volunteered to participate in synchronous CMI. A recording of the orientation session (Session 0) is available at:

http://tinyurl.com/BUS017-R0-Jan13

-------- End of Reflective Journal 1 (January 2013) ---------

APPENDIX T2 - Reflective Journal #2 (January 2013)

Lesson 2 on Tue 8 Jan

According to my timetable, Lesson 2 is also Lab 2 and so I have to plan the lesson with lab activities in mind as well as the first synchronous session (S1). The following course activities were covered:

1. Tutorial 1 Discussion

2. Review of Synchronous Orientation Recording (http://tinyurl.com/BUS017-R0-Jan13)

3. Course Assignment File-naming Convention

4. Lab 1 Exercise (website)

5. Lab 2 Exercise (animation)

6. Group Formation for Course Assignment

7. Synchronous Session 1 (http://tinyurl.com/BUS017-S1-Jan13)

Activities (1) to (6) were covered in face-to-face mode at LT3.36 between 12pm to 1:10pm but it was not possible to teach (5) (even though it is a simple demonstration in the use of an animation tool) as I had to call a break because the students' attention was waning. After the break, at around 1:30pm, all students and myself went to Lab 3.35. Although Lab 4.35 was also available, given that today was the very first actual synchronous lesson, I decided to group all the participants and students together in one lab for ease of learning and support. While I let the class continued to work on (4) in the lab as well as doing research on their Group Assignment between 1:30pm to 2:15pm, I showed all students how to create animation (item 5) and got my laptop computer ready for (7) which comprised the following:

2:15pm Synchronous Session 1 Start

> [a] Participant test login / audio setup / chat / emoticon / hand raising / whiteboard
>
> Application Sharing Start
>
> [b] IE Browser & Microsoft Expression Web 3.0
>
> (to illustrate the building blocks for Lab 1 Exercise)
>
> Application Sharing End

2:45pm Synchronous Session 1 End

Prior to today's lesson 2, a test session with recording was conducted yesterday. Specifically, the test helped me to re-size the application window (for IE & ExpressionWeb) so that they display properly on the user's screen. Basically, each application's window needed to be adjusted to fit within an area of Blackboard Collaborate otherwise it would create a "black box" on the user's screen. This "black box" is caused by the shared application overlaying the "Participants/Chat" window on the instructor/moderator's computer (i.e. my computer). A recording of this test session is available on:

http://tinyurl.com/BUS017-R1-Test1-Jan13

The wired-Internet connection in the Lab was good and I did not encounter speed-delay issues. Before the participants did [a], however, I requested them to behave properly online by not shouting and using abusive language in chat. When one participant wrote "gay" on the whiteboard in reference to a fellow classmate, I told him/her to "be careful." This incident was captured on the subsequent recording. I'm glad I'd mentioned the need for good online behaviour from all participants before the start of S1 otherwise the session could easily go out of control with the participants behaving badly online. Item [b] via application-sharing also worked well but I could only demonstrate one website building-block (Ladies Clothing Items) from the Lab 1 Exercise instead of two which I had originally planned to do.

In summary, two pedagogical findings are observed from today's first synchronous session: (1) explain to participants the importance of good online behaviour, and (2) be realistic and focus on one single item only when using application sharing to demonstrate learning.

Three more students have requested to participate in the study making the total number of participants for this semester (Jan13): 25.

Today's recording is available on:

http://tinyurl.com/BUS017-R1-Jan13

PS – this recording has no sound. This is unfortunate because as can be seen from the video and contents on the whiteboard, it is a nice and short session for the participants to try out Blackboard Collaborate for the first time. I remember clearly that I have pressed the "Talk" button before speaking with the participants. Why my audio is not captured here baffles me?

PPS – fortunately my earlier test version was recorded and it came with audio but without the presence of students. This is available on:

http://tinyurl.com/BUS017-R1-Test-Jan13

-------- End of Reflective Journal 2 (January 2013) ---------

APPENDIX T3 - Reflective Journal #3 (January 2013)

Lesson 5 on 17 Jan

Today's Synchronous Session 2 (S2) was a real as it got. It began with the participants going directly to Lab 2.35 at the beginning of the lesson and it was planned according to the following manner:

Synchronous Learning Start

12pm

Participants (with headsets) go directly Lab 2.35

Login Synchronous Session 2

(http://tinyurl.com/BUS017-S2-Jan13)

Test Audio

Students (without headsets) come to LT3.36

Tutorial 3 Discussion

EQP Discussion: Topic 2 & 3

End Synchronous Session 2

1pm

Synchronous Learning End

I was at LT3.36 with the "students" (i.e. those without headsets – the non-participants) and login my laptop computer as the Moderator with the video turned. Simultaneously, I also login using the instructor's desktop computer as "Jia Jia," the dummy participant to test the display (as a participant). In order to inform the participants early about S2, I scheduled it in advance for the first time (on Mon 14 Jan) and made available the above login link/address in Lesson 3 (Tue 15 Jan). I even showed the class that if they tried to login now then a message would appear to tell them that S2 would not be available until 11:30am, Thu 17 Jan13. A student reminded me about the need for the class to take attendance. I asked him the starting time of the electronic attendance system for their 12pm lesson. He told me from 11:30am onwards. I then told the participants to come to LT3.36 first to tap their student cards against the e-attendance reader before going to Lab 2.35 to begin S2 at 12pm.

With S2 starting at 12pm, I went into LT3.36 early (by 11:40am) to get my laptop computer connected to the wired network. Apart from a slow start (my laptop is old – 5 years), there was also a delay in connecting to the campus-wired network but once connected, I was able to get a relatively stable Internet connection. By 11:55am, my setup was ready with (1) moderator-login to Blackboard Collaborate for my laptop computer which was also connected to the overhead projector with my computer screen projected onto the two big wide-screens, and (2) student-login as "Jia Jia" on the LT's instructor computer. The participants, however, took a while to login even though I saw them coming to the LT to "clock" their e-attendance before going to Lab 2.35. A couple of confused participants also asked me which lab they should be in. By 12:10pm, the participants managed to login and I started the session. Being aware that the recording for the last session (S1) did not have audio, I was careful to (1) press the "Recording" button first before (2) pressing the "Talk" to begin S2.

The Whiteboard file that I have prepared and tested comprised screen-captures of (1) Lesson Plan, (2) Tutorial 3 Questions and Answers, and (3) Exam Question Paper (EQP) Questions and Answers for Topic 2 and 3.

I used the "hand" pointer to guide the participants' attention on the first learning activity: Tutorial 3 Discussion and then moved the screen forward to the next page containing Tutorial 3 Questions. I invited the participants to use the Chat, the Pen or the Text Box to write their answers on the Chat Box or the Whiteboard. For those students attending S2 face-to-face with me in LT3.36, they watched the participants learning actively together.

Before I moved on to the next activity: EQP Discussion, I clicked on the list of pages (top-right corner) on the Whiteboard and unintentionally selected the last two pages. It turned out that these two pages belonged to my Private Area and by selecting them I had accidentally turned on the Red Border surrounding the Whiteboard. When I moved back to the Main page, I noticed that the students' screen did not move and they were stuck with a blank screen (with Red Border). I was able to see students' screen thanks to login as "Jia Jia" on the instructor computer. As I was unable to undo what I did (i.e. get rid of the Red Border), I stopped S2 and went to the lab to continue with the lesson in face-to-face mode with all students.

While in Lab 2.35, I explained to the class what had happened: that I had accidentally made my screen private, re-login S2 and continued with the EQP Discussion in face-to-face mode but with the recording turned on. I was hoping that the contents on the "Red Border" screens would be captured by Collaborate's recording so that students could review the questions and answers from the recording.

S2 lasted just under one hour because of the above "Red Border" problem. The wired network was working well and my video was appearing fine on the participants' computers in Lab 2.35.

The recording for S2 (with “Red Border” screens) is available on:

http://tinyurl.com/BUS017-R2-Jan13

PS – upon checking the recording, the contents on the “Red Border” screens were captured. Rather than making my screen private, a “Red Border” screen had the effect of enabling the student-participants to switch screens (i.e. move forward and backward).

To turn the Red Border off, this is done by either clicking on the “Follow” box (top-right) or select Tools | Whiteboard | Follow (to make the participants “follow” the moderator’s screen).

---------- End of Reflective Journal 3 (January 2013) ----------

APPENDIX T4 - Reflective Journal #4 (January 2013)

Lesson 6 on 24 Jan

Today's synchronous session (S3) was scheduled to cover the following activities.

Synchronous Learning (S3) Start

http://tinyurl.com/BUS017-S3-Jan13

Topic 4 Software – System s/w, Utility & Application s/w (part 2)

Tutorial 4 Discussion

Synchronous Learning End

Two test sessions were created to generate the following whiteboard files:

[1] Whiteboard_21Jan13.wbd

[2] Whiteboard_24Jan13.wbd

The second file [2] built on the contents first created for [1]. They include:

(i) Lesson 6 Plan
(ii) Topic 4: Software Powerpoint (ppt) upload
(iii) Tutorial 4 Questions
(iv) Tutorial 4 Solutions

As I needed to adjust item (i) this morning, [2] was created with a new version of "Lesson 6 Plan." This whiteboard file was created and tested in today's second test session (Test 2). Item [1] was created during the first test session (Test 1) on Mon 21 Jan. Between Tue and Wed, I was away attending training on Case Teaching so I reviewed my preparation for S3 this morning and did a refresh on the lesson plan and saved this under [2].

The schedule for S3 was good. It started 1:30pm and participants had time to login from Lab 3.35 during their break time. Because Topic 4 is a large topic, I continue with the final quarter of the lecture using Blackboard Collaborate as part of S3. It was also necessary to complete Tutorial 4 by today's lesson because students' second assignment: the online quiz (covering topics 1 to 4), began today.

There was good participation for the 13 participants present and they contributed to the discussion by using the text-box to provide answers on the whiteboard to the tutorial questions discussed. It was a good, error-free session as the network and my laptop video worked well. The only problem I noticed was the slight delay (5 second) in the loading of contents on the

participants' screens due to the use of graphics created on the whiteboard file (the camera-copy images). However, this delay was temporary as once the page is loaded, it could be refreshed quickly.

---------- End of Reflective Journal 4 (January 2013) ----------

APPENDIX T5 - Reflective Journal #5 (January 2013)

Lesson 8 on 31 Jan

Today's synchronous session, S4, covered topic 5 (Computer Networking Technology) of the course syllabus. My normal preparation for a lesson involving synchronous learning went without problems. They included identifying what activities for me to teach and for the students to learn. Topic 5 is a big topic involving different concepts and fundamental principles of computer networking. For the technical-minded students, this is a very interesting topic. For the technical-adverse students, it is difficult for them to comprehend the various underlying networking concepts; for example, making sense of the Public Switch Telephone Network (PSTN) and its importance in computer networking.

Pedagogically-speaking, I have come to realise that the best way for this group of non-technical students to learn about technology is to cover each new topic during the first hour of the lesson, regardless of whether it is in face-to-face mode or in synchronous learning, when their minds and attention are supposed to be at their freshest. For this reason, I spent the first hour presenting to the class on today's lesson's core sub-topics: computer networking basics, wired and wireless networking, last-mile technologies, and local area networks. For the remaining sub-topics of network topology, protocols, and applications, they were taught, after the break, in synchronous learning mode followed by a set of tutorial questions.

Accordingly, my whiteboard file comprised lecture notes and tutorial questions. For today's S4, I purposely did not include the tutorial answers in my whiteboard file because I would like the student-participants to co-construct them in a text box on the whiteboard. It followed that my whiteboard file contained the following items:

> Topic 5 Computer Networking Technology (part 2)
>
> Tutorial 5 Tutorial Questions

My pre-class testing had gone very smoothly and I was looking forward to spend 1-hour with my class on the following S4 learning activities:

Synchronous Learning Start 1:40pm

> Topic 5 Computer Networking Technology (part 2)
>
> Tutorial 5 Discussion

Synchronous Learning End

Given that the student-participants had taken their time to login in the last lesson (S3), I used the break time (20mins) plus 10 extra minutes for them to login to Blackboard Collaborate in the lab. Clearly, 30 minutes are more than sufficient for everyone to login. Unfortunately, today's network in the school was so problematic that only one student-participant (Sun Nee) could login. My own moderator login using my laptop connected to the wired network in the lecture theatre was fine (i.e. only me and Sun Nee could login today). I knew the student-participants were having difficulties login because my own user login as "Jia Jia" on the spare computer failed. It took Blackboard Collaborate a long time to load its Java application but it failed with the "Unable to run xxxxxxx" error message. I went to Lab 3.35, apologised and explained to the student-participants about the school network problem, and then asked them to return to LT3.36. I also asked if Sun Nee, who managed to login, would like to stay in the lab by herself and learn in synchronous learning mode. She did not want to do this as she preferred to join the rest of her class-mates.

With all students back in LT3.36, I continued with my lesson with Blackboard Collaborate projected onto the two large white-screens and turned off the video (this was not necessary as everyone could see me in face-to-face mode). When topic 5 was completed and we began the tutorial questions, I told the class that I had turned on the recording so that our working on the tutorial questions would be captured but there would be no audio because I was communicating directly with the class face-to-face.

If it was not because of today's school network problem, I am very sure that S4 would go according to the way I had planned out in that the student-participants and I would spend one-hour co-constructing knowledge together by using the pen or the text box to work through the tutorial questions on Collaborate's whiteboard. The irony of today's S4 is that we were let down by the school's network when the class was learning about the very same topic of computer networking! I just hope that the school network would be back functioning as per normal in our next synchronous session (S5) on 7 Feb.

The recording of S4 is available on:

http://tinyurl.com/BUS017-R4-Jan13

---------- End of Reflective Journal #5 (January 2013) ----------

APPENDIX T6 - Reflective Journal #6 (January 2013)

Lesson 10 on 7 Feb

My worst fear for a synchronous session happened in today's S5. The topic for this lesson was about Computer Security (topic 7) and the usual preparation for a synchronous session went accordingly including (1) two test sessions and (2) the creation of a whiteboard file comprising:

(a) Lesson Plan (DOC)

(b) Course notes (Topic 7) upload in PPT format

(c) Tutorial activities for Topic 7 (PDF)

The lesson plan for the synchronous part (i.e. S5) of the lesson was due to begin after the break at 1:30pm and one hour was allocated for items (a), (b) & (c). Item (b) was a continuation of the lecture on Topic 7 that was delivered in two parts (i & ii) with the first part in face-to-face mode and part (ii) via synchronous CMI in Blackboard Collaborate web conferencing. Item (c) was planned to be a tutorial in which the participants were to co-construct the answers together on the whiteboard using the text-boxes under my facilitation. This pedagogical approach, I believe, would generate good learning interests among the participants as well as the students (i.e. those non-participants who attended S5 in face-to-face mode) because of the constructivist and participatory nature of the learning.

However, S5 did not start at all due to network login failure. In S4, I had experienced this problem for the first time and that session was delivered in face-to-face mode with the tutorial (without audio – I turned the "Talk" button off) recorded on Collaborate. Knowing this problem could occur again, I even tested the network the day before S5 (i.e. on 7 Feb, 3:30pm) in the lecture theatre. Login was not a problem during the test because after 3pm the afternoon session of classes were over and most students would have left the campus thus freeing up the network again. The login problem in Collaborate was due to heavy network utilisation. Collaborate's Java applet simply could not be downloaded onto any of the computers in the lecture theatre and in the lab. However, my own notebook computer connect to the campus network with the spare wired network cable in the lecture theatre was working fine (i.e. I could download Collaborate's Java login).

I even made arrangement with the participants that if I could not download the Java applet on the lecturer's computer then we would do S5 in face-to-face mode with recording. By 1pm, after I had delivered item (b) part (i) to the class, I tried to login to S5 but failed (i.e. the Java applet could not be downloaded). I told the participants to try download and login in Lab 2.35 after the break. If by 1:40pm, it didn't work then they should return to the lecture theatre. While the class

was taking the break (between 1:10pm to 1:30pm), I called IT support and a technician came to check my network problem in LT3.36.

He explained that due to network migration/maintenance work, the network segment in LT3.36 and in the labs is affected and Collaborate's Java applet download would not work. I showed him my notebook computer's Collaborate login and he said the spare network cable provided a connection to a different segment hence my own notebook computer was not affected. He told me that in future if I needed to conduct Blackboard Collaborate sessions I should inform the IT department first so that they could make the necessary arrangement and test the computers in the LT and Labs beforehand. I said I have never encountered this problem in which no computers could down Collaborate's Java applet before until S4 (two weeks again) and today. Last semester and the semesters before I could run all the Collaborate sessions and all the student-participants were able to login without problems.

As far as item (c) was concerned, I conducted it in Collaborate by doing a recording with the video and audio switched for the participants, who had left the lab and returned to the LT to rejoin the class by 2pm.

Looking ahead, I have two more synchronous sessions remaining but one session (S6) shifted to another day (without labs available) because of another lecturer's teaching-change request. I plan to conduct S6 with Collaborate recording and S7 a normal synchronous session (provided the network would work). I will contact the IT department about S7 to see if they can provide me with a network that works for the downloading and running of Collaborate's Java applet on the computers in the lecture theatre (LT3.36) and in the labs (Lab 3.35 & 4.35).

The recording of S5 is available from:

http://tinyurl.com/BUS017-S5-Jan13

PS: An important point worth noting is that I did not show my frustration in front of the students as a result of the non-functioning network. Instead, I thanked the IT technician for his support and the students for their patience. I explained about the network problem to the class and thanked the participants for keep trying to login Collaborate in the lab. While I was very disappointed with the campus network, I reminded myself to stay calm, composed and not to show my negative emotions so as not to affect students' mood for learning. On reflection, I am glad to report that I have succeeded in keeping my own emotions under control throughout the whole of S5.

---------- End of Reflective Journal #6 (January 2013) ----------

APPENDIX T7 - Reflective Journal #7 (January 2013)

Lesson 12 on 19 Feb

In view of the recent network / login problems with Blackboard Collaborate, I adopted a different approach for the above session (S6). Today's final lab session (Lab 8) provided students with the opportunity to practice hands-on learning by building a database using Microsoft Access 2007. The topic of database (Topic 8) was taught in a face-to-face lecture to Class 5B on Fri 15 Feb 2013. I recorded a demonstration, using application sharing, of the Access Lab Exercise using Blackboard Collaborate and produced the following recording:

http://tinyurl.com/BUS017-R6-Jan13

Thereafter, I made a local version (Unplugged Recording) of this recording by publishing it to my laptop computer using Blackboard Collaborate's Publisher software. This local version was copied to a thumb-drive and I took it with me to play it on the computer at LT3.36 last Fri 15 Feb. Playing this local version was necessary because R6 would not be playable from the LT computer (due to network problems). I asked the student-participants to watch this recording at home (i.e. away from the inaccessibility of the school network) so that they could work on the Access Database Exercise in today's final lab session.

Several student-participants were able to show me their Access database created based on this exercise. Clearly, my recorded lab-demonstration instruction has helped them to understand the key concepts of database (such as data dictionary, data types, primary key, reports and queries) better and their learning was reinforced by hands-on building a database. For the non-participating students, they went to another lab and I did a face-to-face demonstration to show them how to do this exercise.

Had I planned S6 as a normal synchronous session, then we would encounter the same network / login problems as in S5 and S4. As it happened, it made sense that I switched the delivery of S6 with the use of recording because my lesson 11 last week (Thu 14 Feb) which came with the labs was changed to Fri 15 Feb at the request of another Instructor. S6 was supposed to be on 14 Feb but because of the non-availability of labs on 15 Feb, it (i.e. S6) was re-scheduled to today instead. For this January 2013 semester, a total of seven (instead of eight) synchronous sessions were held as a result of timetable-change.

Regarding the on-going network / login problems with Blackboard Collaborate, two events have occurred that make me more optimistic for the next semester starting on 1 April 2013:

1) I reported the problem to my colleague who oversees the provision of Blackboard Collaborate for all users (instructors and students) at SIM University (see e-mail dated Feb 2013 attached).

2) Today, I received an e-mail announcement (dated 16 Feb 2013) from the President of Blackboard Collaborate explaining that the system has not been performing normally in recent weeks because of the "denial of service" (DoS) attacks on its host system (attached).

In closing, despite the "up and down" nature of this semester's (January 2013) synchronous sessions, I still believe in synchronous computer-mediated instruction (CMI) and I look forward to resume using Blackboard Collaborate v12 in my research study from 1 April 2013.

---------- End of Reflective Journal #7 (January 2013) ----------

APPENDIX T8 - Reflective Journal #8 (January 2013)

Lesson 14 on 21 Feb

Yesterday's synchronous session (S7) was an unscheduled, ad-hoc session. I did not need to create/conduct this 7th session in view of the network/login problem that I have encountered this semester. However, in the midst of analysing data from last semester's (Oct 2012) student-participant interviews, I noted that a common theme emerged from the transcripts is a request from the participants for examination revision to be included in a synchronous CMI session. Normally I would conduct the revision with my class in the last lesson of the course (i.e. Lesson 14) by letting the students work through a past examination paper first and then discuss the solutions with the class.

This semester, due to my request of a makeup class (because I had to take time out to attend the Case Teaching Training in January), Lesson 14 was re-scheduled on the same day immediate after Lesson 13. What this means is that both the students and I went through back-to-back two 3-hour lessons from 12pm to 6pm continuously yesterday. Clearly attention span is a problem for everyone, me included, even for the most enthusiastic students. It is mentally and physically draining for students to sit through 6 hours of face-to-face lessons continuously. Officially, the timetable has a 30 minutes break (i.e. 12pm to 3pm and then 3:30pm to 6:30pm) in between but in order to make the students feel comfortable about the long afternoon, I agreed to shift Lesson 14 so that it would start at 3pm and end 6pm. They all agreed to finish yesterday's lessons earlier by 6pm instead of 6:30pm.

In the light of these two back-to-back lessons and the qualitative data from last semester's student-participants requesting that examination revision be conducted in synchronous-CMI mode, I took the opportunity to turn Lesson 14 into a synchronous session (i.e. S7). However, the participants have already returned their USB headsets to my Research Assistant earlier in Lesson 13 and that no labs were available for our use today. S7, therefore, was conducted with a live recording in the lecture theatre for all students in face-to-face mode but only the student-participants would get to view it afterwards, from:

http://tinyurl.com/BUS017-R7-Jan13

Given that S7 is about examination revision, naturally all students would want to have access to the recording. Unfortunately, in keeping with the spirit of this research study, only student-participants got to view the recording.

In conclusion, S7 has given me the opportunity to put Norton's (2009) pedagogical action research into practice in that through cyclical reflection and improvement, I am making changes to the way I conduct synchronous CMI (i.e. my research intervention) by refining and adapting it to meet the learning needs of students. While "on paper," I could wait until the next semester

(i.e. Apr 2013) before conducting synchronous CMI in this manner, I implemented the change immediately in order for it to benefit the current semester of students. Putting new pedagogical findings into action immediately, I believe, is the real value of my research investigation. To this end, Morgan's (2007) "pragmatic approach" paradigm fittingly describes my own belief towards this research study on synchronous CMI. In short, my view on the process of educational research is that it should lead to some outcomes that are beneficial to the stakeholders (i.e. students, instructors, and administrators).

References

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Morgan, D. L. (2007). Paradigms Lost and Pragmatism Regained: Methodological Implications of Combining Qualitative and Quantitative Methods. *Journal of mixed methods research*, *1*(1), 48-76.

---------- End of Reflective Journal #8 (January 2013) ----------

APPENDIX U1 - Reflective Journal #1 (April 2013)

Lesson 1 Synchronous Session 0 (Orientation) 2 April 2013

Preparation for S0 began on 27 Mar at the end of the "March" semester break. My biggest concern for the new semester was about the reliability of the campus network and the availability of Blackboard Collaborate. Due to a combination of network congestion on campus and Collaborate experiencing distributed denial of service attacks back in February, several synchronous sessions did not go well last semester. The initial test of 27 Mar indicated that the situation has improved as I was able to create and record a dummy orientation session comprising the following agenda items:

Agenda

Audio Test

Video

Whiteboard

Chat

Emoticon

Etiquette

Application Sharing

The recording of this test session is available on http://tinyurl.com/BUS017-R0-Apr13

A second test was conducted on 1 April to create a whiteboard file with the above agenda items.

For the actual orientation session (S0) on 2 April, the whiteboard file was augmented to include powerpoint (PPT) slides as part of the PPT upload test. This is available on http://tinyurl.com/BUS017-S0-Apr13. All three sessions were created on my office computer without problems.

The real test of network and Collaborate availability would take place in the actual teaching environment and for this semester I was allocated two lecture theatres (LT4.36 & LT2.21) and two labs (Lab2.35 & Lab3.35) for my class. Yesterday's first lesson was held in LT4.36 and, unlike the LT that I used last semester (LT3.36), it does not provide a spare network cable for laptop computer connection. I had to rely on the campus' wireless network instead. Fortunately, it offered good speed and Collaborate for S0 was loaded quite smoothly for me to login as the Moderator. The instructor's desktop computer has a wired network connection and I also used it

to load Collaborate S0 and login as a student. To my relief, this computer also worked quite well and Collaborate did not take too long to be available.

S0 was introduced to the class with a discussion of the above agenda items. The recording of the first test session (27 Mar) was also shown to the class. Overall, the campus network and Collaborate worked well and the orientation went quite smoothly. While feeling satisfied, the real test comes in S1 when all the participants would login from Lab2.35. I shall find out the stability of the lab environment in Lesson 2 on 5 Apr.

---------- End of Reflective Journal #1 (April 2013) ----------

APPENDIX U2 - Reflective Journal #2 (April 2013)

Lesson 2 Synchronous Session S1 (5 April 2013)

With relief, S1 went very well in Lab2.35 and Lab3.35 yesterday. Both campus network and Blackboard Collaborate were stable and the session had 20 users login: myself and Kai Kai (dummy student) in Lab3.35 plus 18 student-participants from Lab2.35. Everyone had a good learning experience together. The session was divided into two parts: (1) free exploration of Collaborate and (2) remote desktop support.

The participants freely explored the various features of Collaborate by “playing around” with chat, audio, emoticon and the whiteboard. After the formality of the Orientation in which I showed them how to login and test audio, giving the participants a free hand was the best way to get them excited about synchronous learning. A few participants got too excited by making funny jokes on the chat and login without their real names. I reminded them about etiquette and that in the next session they have to login properly.

S1 was also a lab session and I used application sharing to demonstrate the Lab 1 exercise of constructing a homepage for the 'A-Mart' online clothing store. A recording of this segment of S1 was made to show the participants the full capabilities of Collaborate. This is available from two sources:

http://tinyurl.com/BUS017-R1-Apr13

http://goo.gl/N60ka

The 'tinyurl' service is not as reliable as used to be so 'goo.gl' was used also as an alternative for the participants to access the recording. One problem with this recording is the absence of audio input from me because I had forgotten to press the 'Talk' button.

As the participants became familiarised with synchronous learning, I asked for a volunteer to make his computer (B) available in Lab2.35 for me to access remotely from my computer (A) in Lab3.35 in order to test and demonstrate remote desktop support (RDS) by integrating the technologies of Windows Remote Desktop (WRD) and Collaborate's Desktop Sharing (see Remote Desktop Support in the main document).

With a stable campus network and Collaborate functioning normally, the true potential of synchronous learning was realised in S1 in terms of (1) providing participants with a good learning experience and (2) bringing technology for teaching and learning to a higher level with the possibilities offered by remote desktop support.

---------- End of Reflective Journal #2 (April 2013) ----------

APPENDIX U3 - Reflective Journal #3 (April 2013)

Lesson 4 Synchronous Session S2 (12 April 2013)

When the campus network works and Blackboard Collaborate is available, it is a joy to teach synchronous learning. The participants felt this way too in yesterday's session (S2). Instead of the usual “participants go to the lab” approach, I tried something new for a change: the instructor (i.e. me) moved to a different location to conduct the session. Given that the attendance has dropped since the first week (not unusual in the Diploma in Management Studies program), I observed that all students can fit into one lab so I decided to use Lab2.35 only for yesterday's second lab session even though both Lab2.35 and Lab3.35 were scheduled for my class. After a short briefing and demonstration about the lab exercise (creating animation images for a website) in LT2.21, I send the whole class to Lab2.35 to work on this short exercise. I joined them in Lab2.35 to supervise the lab session.

By 1:30pm, after the break, I resumed part two of the lab session by meeting students in small groups to discuss about the progress of their course assignment (building a website). By around 2:20pm, I began synchronous session S2. Participants were asked to login S2 while those non-participating students followed me back to LT2.21 from where I login S2 and conducted the following activities:

1. Shared desktop to demonstrate horizontal spacing control of a webpage in Microsoft Expression Web 3.0

2. Previewed next week's lesson schedule

3. Invited user participation on the chat

4. Encouraged participants to write/draw on a new-whiteboard page

5. Demonstrated the power of real-time video by carrying the laptop with the webcam still switched on as I walked back to Lab2.35 for participant debrief.

Item 5 was most interesting. I suddenly had this idea that I did not need to switch off the webcam and logout from S2 before going back to meet the participants in Lab2.35. I could just carried the laptop with S2 still login by me and the webcam “watching” me as I walked back to Lab2.35. It was quite exciting for both the participants and me as they watched me walking in real-time on the Collaborate S2 session. One participant even opened the door for me as he saw me approaching ithe lab in real-time on his computer from my webcam video.

A recording of S2 is available on:

http://tinyurl.com/BUS017-R2-Apr13

http://goo.gl/hvTtS

The recording was off when I walked back to Lab2.35 carrying my laptop computer but I should have left it on to capture the instructor in action/motion in a synchronous session. This instantaneous, unplanned approach to S2 with the instructor in motion turned out to be an effective pedagogy for synchronous learning.

---------- End of Reflective Journal #3 (April 2013) ----------

APPENDIX U4 - Reflective Journal #4 (April 2013)

Lesson 5 Synchronous Session S3 (16 April 2013)

Lesson 6 Synchronous Session S4 (19 April 2013)

This journal covers two synchronous sessions (S3 & S4) held this week and highlights the issues and successes encountered.

Session S3

The following classrooms were allocated for this lesson: Lecture Theatre 4.36 and Labs 2.35 & 3.35. Given that some students were absent, I used Lab2.35 only because the computers in this lab are better than those in Lab3.35. Having done many synchronous sessions, apart from technology readiness (i.e. the network and Blackboard Collaborate availability), it is necessary to design a lesson in such a way as to ensure a smooth transition for the participants from face-to-face learning in the LT to synchronous learning in the Lab. The delay has always been the time required for all the participants to login to a synchronous session because of (1) the limited speed of the campus network, (2) the not so fast Lenovo ThinkPad computers used in the Labs, and (3) the fact that everyone was trying login simultaneously from the same network. For these reasons, I set the session start time at 1:20pm so that the participants would use their break to go to Lab2.35 to login. The physical location is also a factor because Lab2.35 is two floors below LT4.36 so the participants would need some time (5 to 10mins) to reach the lab.

Another problem I experienced in the past is that previously I would, for a synchronous session, continue to deliver the second part of my lecture topic and then do an activity (i.e. a tutorial exercise) all at the same and usually I would end up running out of time or conducting the session too rapidly. With the benefit of experience, this semester, however, I focused on one activity only. In the case of S3 it was working with the students and participants on a tutorial exercise for topic 3 (Computer Hardware: Input/Output and Storage). S3 was designed according to the following lesson plan:

12:55pm – 1:20pm [25mins]

Break

Participants go to Lab2.35 to Login S3

http://tinyurl.com/BUS017-S3-Apr13

http://goo.gl/Jm3qS

Students return to LT4.35 after break

1:20pm – 1:55pm [35mins]

Synchronous Learning S3 Start

Tutorial 3

Synchronous Learning S3 End

1:55pm – 2pm

Students and Lecturer go to Lab2.35 for debrief with participants

Despite the extended time given for the participants to login, S3 did not get started until 1:30pm but once they did login we all had a good, interactive session including the face-to-face students who were with me in LT4.36. As I went through each tutorial question, I asked the participants to first discuss their answers on the Chat and then one participant would write the correct answer on the Whiteboard using a Textbox at the correct location next the question. Face-to-face students also contributed but their level of participation was less than the participants, I observed. The recording of S3 is available on:

http://tinyurl.com/BUS017-R3-Apr13

http://goo.gl/J0rQy

Session S4

This afternoon's synchronous session conducted earlier was similar to S3 and the activity we worked on was about a tutorial on past examination questions relating to topics 2 and 3 which the class had just finished learning.

Unlike S3, the design for this session is different:

1:55pm – 1:20pm [25mins]

Break

All students and lecturer go to Lab 2.35

1:20pm – 1:50pm [30mins]

Topic 4 Software – System, Application Software & Utility (part 2)

Tutorial 4

1:50pm – 2:25pm [35mins]

Groups to update Lecturer on CA1 progress (3mins/group)

2:25pm – 2:30pm [5mins]

Lecturer and students go to LT2.21

Participants remain in Lab2.35

2:30pm – 3pm [30mins]

Synchronous Learning S4 Start 2:30pm

http://tinyurl.com/BUS017-S4-Apr13

http://goo.gl/4gDFg

Exam Revision on Topic 2 & 3

Synchronous Learning S4 End 3pm

Basically, S4 started 2:30pm after the non-participating students and I went back to LT2.21. As the lecture theatre and lab are both on the same floor, it is only a short distance between the two rooms so it helps with the smooth transition for the participants to login because they were already in Lab2.35. S4 went well with the participants and students participated in the synchronous session in a similar manner as S3.

Despite the best design for each synchronous session, however, a persistent and re-occurring problem is the slowness of my Fujitsu Windows Vista laptop computer. I needed to use it because of its webcam (no webcam is available on the instructor computer in either the lecture theatres or labs in the campus). It is not a problem once I login to Blackboard Collaborate but it took over an hour for it to shutdown properly after S3 when I used it for both face-to-face and synchronous teaching. Another lesson learned is that I should use my laptop computer for one activity only: synchronous session with webcam.

The recording of S4 is available from:

http://tinyurl.com/BUS017-R4-Arp13

http://goo.gl/WNLSR

Learning point/problem arising from S4: for the face-to-face students in LT2.21, I used the instructor computer which was already connected to the large-screen projector to show the Collaborate session. I did this by login as "Jia Jia," the participant, while on my own laptop computer, I login as the moderator. I did not want to switch the projection from instructor computer to my laptop because that would delay the start of the session (another factor to consider in the smooth running of a synchronous session). However, for a moment, I got confused by my own audio. What happened was my own audio was broadcasted over the large

public speaker in the lecture theatre. This “strong” echo made it difficult to conduct the session with the face-to-face students though the participants in Lab2.35 were unaffected. The reason why this occurred was because I had used the instructor computer for projection and by default both the computer screen and its audio output are broadcasted through the projection system. The reason why my own audio was broadcasted loudly was because I had login to the instructor computer as “Jia Jia” and when I spoke into my laptop computer, my audio-output also reached Jia Jia’s computer (i.e. the instructor computer). To stop my own audio-output from coming out of the LT speaker, I turned the audio/speaker indicator on the instructor computer to “mute” and this dual-audio problem was solved.

---------- End of Reflective Journal #4 (April 2013) ----------

APPENDIX U5 - Reflective Journal #5 (April 2013)

Lesson 10 Synchronous Session S5 (3 May 2013): Exam Tutorial

Lesson 11 Synchronous Session S6 (7 May 2013): Access Lab

This journal covers the two synchronous sessions (S5 & S6) held on Fri (3rd) and Tue (7th) and highlights the issues and successes encountered.

Session S5

A break from synchronous learning was provided to the class to enable all students to prepare for their in-class assignment (website) presentation in Lesson 9 on Tue 30 April. For this reason, the last session (S4) was held on 19 April.

Based on the experience learned from previous sessions, S5 focused on one activity only: working on an examination tutorial question covering Topics 4 & 5 and in order to ensure minimal disruption for all students it was scheduled in the last segment of Lesson 10. The movement of participants between lecture theatre (LT2.21) and lab (Lab2.35) was also kept at a minimum in that I used the break to move everyone (myself included) to go to Lab2.35 (from LT2.21) for the second half of Lesson 10. After I had completed teaching Topic 7 Ethics and Computer Security in the Digital World, I asked the participants to login to S5 while the non-participating students and I moved back to LT2.21. The time taken for the participants to login at Lab2.35 was sufficient for me to bring my laptop computer (already login as moderator) and walked the short distance back to LT2.21. Even plugged in the power socket and wired network would take time so I ran my laptop computer on battery and wireless but I still had to test my audio which took a few minutes of delay. As for the students arriving back at LT2.21, I login the instructor computer as student “Kai Kai” and projected the screen onto the large whiteboard. Again, with the experience learned from S4, I turned the instructor computer audio to “Mute” to prevent my own audio from projecting across the loud speakers.

With everyone ready, I turned on my webcam and check audio with the participants in Lab2.35. Someone told me via the Chat that he/she could not hear my audio and I realised that I did not press the “Talk” button. Thereafter, everything was working and I turned on the Recording to conduct S5. Before the session ended, I showed the class “Topic 7 Learning Summary” and briefly explained about this one-page document on Blackboard Collaborate and then handed out a hardcopy to everyone (I also went back to Lab2.35 to debrief and distribute the hardcopy to the participants).

S5 recording is available on:

http://tinyurl.com/BUS017-R5-Apr13

http://goo.gl/t4sQS

Session S6

S6 is not so straightforward because it involves a demonstration of Microsoft Access 2007 as part of today's lesson on Topic 8 Database Management System. Given that all students are experiencing "lab fatigue" by now and also because today's lesson takes place in LT4.36 and Lab2.35, it would not be a good idea to ask the participants to move from level 4 to level 2. Instead, I have embedded S6, a pre-recorded session with Blackboard Collaborate, into today's lesson and delivered it as part of my lecture on Topic 8 in LT4.35. Participants were provided with the option to view S6 again if they wish to do so.

A unique feature of S6 is that the recording captured the following activities:

1. Microsoft Access 2007 lab exercise demonstration via Desktop Sharing

2. Remote Desktop Support (RDS) of Microsoft Access 2007

This way this was done involved using my desktop computer (A) to establish and remote connection to my laptop computer (B). The rationale for doing RDS here is because my computer A does not have Microsoft Access 2007 installed whereas computer B has the license to run this software application. During the recording, I also used a third computer (C), my iPad Mini, to login as student "Kai Kai" to check on the appearance and refresh-rate of desktop sharing of computer A with RDS connected to computer B (recall that the screen of this computer is blank/locked when accessed by A).

When I conducted S6 in class today, I also explained to the students about the power and capability of real-time remote desktop support while demonstrating the use of Microsoft Access 2007 to work on their database exercise.

The recording of S6 is available on:

http://tinyurl.com/BUS017-R6-Apr13

http://goo.gl/mcO3y

---------- End of Reflective Journal #5 (April 2013) ----------

APPENDIX U6 - Reflective Journal #6 (April 2013)

Lesson 12 Synchronous Session S7 on 10 May

S7 is the final synchronous session of the semester (April 2013) with Class 5B. We covered the following two activities in Lab2.35:

1) Quick Review of Tutorial 8
2) Exam Briefing

The end of semester is coming and examinations are looming for the students. Their primary interest and concerns are about examinations. As a result of survey-feedback from students in the last semester, examination briefing is introduced as a topic for synchronous CMI.

During the last segment of Lesson 12, participants went to Lab2.35 to login S7 while the non-participating students and I remained in LT2.21 as before. The web-conferencing system (Blackboard Collaborate) worked well even on my laptop computer's wireless connection. I also had the opportunity to use Collaborate's web-tour to show students about the downloadable revision guide. S7 went smoothly without problems. The recording is available from:

http://tinyurl.com/BUS017-R7-Apr13

Mobile/YouTube Recording

A significant pedagogical breakthrough emerged last week. After using the recording of the Access Lab as part of my S6 delivery (see Reflective Journal 5), it occurred to me that the best way for students to use the recording is to view it on a mobile device such as an iPad while working on their Access Database Exercise. This method of learning is non-intrusive compares to the intrusive approach in that when a student works on the exercise while viewing the recording on his/her computer simultaneously there is a need to switch between two different screens: (1) recording of the Access Demo and (2) Microsoft Access 2007.

On the other hand, when a student views the recording on iPad, for example, and listens to the instructor's step-wise explanation over a headphone while performing the exercise on the computer, he/she is experiencing seamless learning.

However, in its current format, the recording hosted by Blackboard Collaborate does not play on mobile devices. When viewed on the iPad, an error message appears (see Diagram 1).

Diagram 1: Error Message on iPad

In the case of using iPad as the mobile device, this error is due to a lack of support for Java-based applications from Apple. Other mobile devices such as Android phones have not been tested.

For the Access Lab demo to be playable on iPad, the following customisation was made:

1. Use Collaborate Publish to download a local version of the recording in MP4 format.

2. Reduce the length of the video to under 15minutes using Windows Movie Maker

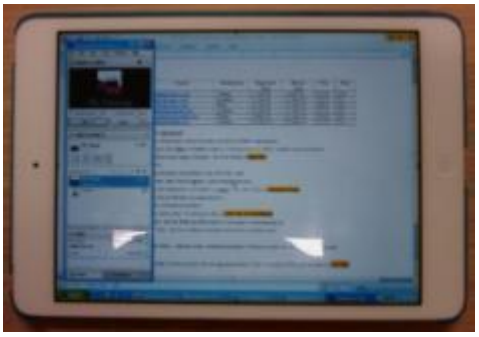
3. Upload the recording (now in WMV format) to YouTube (with video length of 15mins or shorter).

4. Download the free YouTube app for iPad.

5. Play final YouTube video (in WMV format) on iPad.

Diagram 2 shows the Access Lab recording successfully playable from YouTube on iPad.

Diagram 2: Access Lab on YouTube



The YouTube version of Access Lab is available from:

http://tinyurl.com/BUS017-S6-Apr13

while the original version may be played back from Blackboard Collaborate on:

http://tinyurl.com/BUS017-R6-Apr13

---------- End of Reflective Journal #6 (April 2013) ----------

APPENDIX V1 - Peer Debrief Transcript#1 (October 2012)

[BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12 11:30AM TO 3PM]

[9 October 2012]

[STEPHEN ROWE]

Rather than "signal" try to do as you did earlier and ask for smiley face or green tick - I would suggest green tick as it is likely to be more useful if you want to use a poll.

[STEPHEN ROWE]

Good to check that online students see the slide move on; also letting students know about the visibility of the names for online that is not available for those in the room. Same later for ROM.

[STEPHEN ROWE]

Good to see the pointer being used; also use of chat ... remember could add that to the Whiteboard (system memory) as well to emphasise the link to Ram in a visual way? .... When you are explaining volatile (a definition) that is a good example of an opportunity to involve students - ask them what they understand it to mean so that you expose the range of understandings (or lack thereof) ... could perhaps achieve the same by a poll?

[STEPHEN ROWE]

When Cheryl raised her hand ... finish making your point and THEN take the question ... not being able to hear is another example of when the image interface might be helpful to point her to the audio setup.

[STEPHEN ROWE]

Your solution eventually to ask them to come back to room if they cannot join - perhaps should be a "Plan B" so they do not interrupt with that request?

[STEPHEN ROWE]

Remember that you can turn off their whiteboard tools so they cannot mess slides up unless you specifically ask them to and turn the tools back on.

[STEPHEN ROWE]

Good to remind students how to communicate with you especially when they had joined later. Your humour was working well it seemed :).

[STEPHEN ROWE]

Good use of pointer for Cache diagram ... perhaps for a diagram, the crayon or circle tool might be an alternative to consider ... different colour for the different types of cache you were highlighting? Perhaps the diagram could use filled in box to cover the labels and ask a volunteer to indicate where each of the types of cache are located? The point is to allow the students to "develop" the diagram or populate it rather than just listen and watch you?

[STEPHEN ROWE]

Doing a good job checking in with the online group.

[STEPHEN ROWE]

Storage speed slide is another good example of how you might invite the group to contribute ... ask them to indicate which side they would put slowest or fastest on? You did a good example lining it to the non-volatile and volatile though, so using the interactivity well and linking bakc to the earlier concepts.

[STEPHEN ROWE]

Good to ask students about most common port for "Outside of the Box" slide. Summary slide really good ... consider legacy ones box around in red; current ones "green". Add "transistor" on the whiteboard?? especially if it is important?

[STEPHEN ROWE]

Good to see the 20 joined online and it seemed to go pretty well.

[STEPHEN ROWE]

Audio automatically adjusts by default (you can turn it off).

[STEPHEN ROWE]

Clearly at home using the whiteboard tools so your challenge is to harness that and it should offer you encouragement that students have no problem using a variety of tools ... just figure out some tasks to give them the opportunity.

[STEPHEN ROWE]

Well done on figuring out your "red box" ... it is the "follow moderator" box being unchecked rather than anything the students did.

[STEPHEN ROWE]

Consider making the tutorial questions polling ... or some of them? and then you can ask for specific input ... or take a snapshot of the questions or even better ... how about having a series of images of the "box" or slides used and asked the question and ask a student to point of highlight the answer to the question? Or draw a line from the various words to the relevant part of the image? That said, the discussion bubbled along very nicely and at a quite a pace because you had a range of input quickly ... that is a good number of simultaneous chat contributions not just a single voice ... of course, a challenge to manage is to make sure as you did once, that the online group does not dominate so that those in the room simply wait for the chat to be added :) ... this is an interesting point to manage!

[STEPHEN ROWE]

Excellent to see how the students figured out how to annotate the whiteboard slide ... again showing you how they pick this up very quickly.

[STEPHEN ROWE]

A final comment relating to your point at the end about being "exhausted" in relation to a few suggestions above about finding ways to allow students to be more directly involved ... I suspect this is a way to allow yourself some time to draw breath and take a break so that you do not feel like you need to be talking on-stop for the whole session ... this is one of our biggest challenges in my view. However, the session shows enormous potential for that to be developed in my view.

---------- End of Peer Debrief Transcript#1 ----------

APPENDIX V2 - Peer Debrief Transcript#2 (October 2012)

[BUS017 SYNCHRONOUS SESSION 3 THU 18OCT12 11:30AM - 3PM]

[18 October 2012]

[STEPHEN ROWE]

[STEPHEN ROWE]

I noticed when I loaded this link for Topic 4 that it took me here: https://sas.elluminate.com/site/external/installinfo/playback?psid=2012-10-18.0010.M.D4AFC4E4CC19D83B1B77D1343CEB5B.vcrBUT it was via the support website to get the required software or begin the session. Not sure if this was by design or something that my machine decided it wanted to do at that moment?

[STEPHEN ROWE]

I have not made any notes for Lab 2 as the comments are quite similar to my thoughts for Topic 2, noted earlier.

[STEPHEN ROWE]

I like the beginning making the point for offering a "capture" of the answers discussed already to allow ease of access to answers ... one possible downside of this is to be careful that students do not get the impressions that if they do not turn up they will still be able to get the answers rather than have some process THEY need to go through to get the answers themselves. This is a challenge to think through :).

[STEPHEN ROWE]

Great that you move straight on to then offer student the chance to provide answers to the next se5t of questions. Nice that you have been able to be flexible and bring students from the lab into the room. When providing the answers in blue, did you have the answers already there and reveal each one, or were you typing in the answers as you want (**) ... for question 3 why not simply update the answer on the w/b - put a line through operating system and type in bios or add bios as #1 and type #2 before operating system? That way anyone watching the recording gets the updated version as well by virtue of you taking advantage of the tools? (**) I worked this out! ... you have loaded a "new" or updated slide for each new answer I can tell by the number of slide change markers on the recorder bar ...

[STEPHEN ROWE]

Suggestion: have all your answers on the one slide and cover with a filled in box tool that you have changed the colour of to match (as close as possible) the slide background.

[STEPHEN ROWE]

Strategy for getting others involved /// how about (I know this configuration for class was unplanned too :) ... have the questions divided into three groups so that you only take an answer from that section of the audience? Good to see the diversion of Chih Seng in 3.35 ... I guess for you the potential to join from anywhere anytime is one you need to be careful NOT to promote :(. Very good how you later refocused on the class and then went back to the online pair for the final question - well done.

[STEPHEN ROWE]

Notice how having the one student online that your focus changed significantly to Chih Seng (and the class as well) so that is an interesting dynamic as when the second student joined ... just be careful not to let the technology drive the purpose of your session ;). Same with Shareware ... as noted above, add it to the w/b so it is not just in the chat area (which, of course, is a good alternative.

---------- End of Peer Debrief Transcript#2 ----------

APPENDIX V3 - Peer Debrief Transcript#3 (October 2012)

[BUS017 SYNCHRONOUS SESSION 4 TUE 23OCT12 11:30AM TO 3PM]

[23 October 2012]

[STEPHEN ROWE]

Topic 5: like the little outline at the top of the slide (nice idea)

[STEPHEN ROWE]

Good to see the pointer being used - seem to be quite comfortable with it.

[STEPHEN ROWE]

Suggestion for Network fundamentals slide (Hardware) ... it is terrific how you distinguish the hardware in/on the computer from the router and switches for transmission and discussed them as groups (rather than sequentially as shown on the slide). You might have highlighted the groupings visually to emphasis that point this way: use the empty box tool in one co9lour for a and b and e and then another colour for c & d ... or boxes for a, b ,e and the empty circle for c & d ... you get the idea.

[STEPHEN ROWE]

Really good to see the "real" example of the WAP pointed out for the students. Excellent for them to see the principle and terminology in a familiar context/environment. Notice when you asked the online group and they responded in chat just how many variations and interpretations you received in response? I think this is a telling difference to the f-2-f situation where we point to an object and "can see" those present look at it and so we then assume they "understand" but online we need to be more explicit and respond to the variety of interpretations and NOT assume they ala "understand" because they "show/tell" us otherwise by their chat responses :) ... I think this is a very significant point in the learning online with these technologies. I call this "unleashing the (voice of the) silent majority".

[STEPHEN ROWE]

Answering Ham's question and other comments/online students joining ... notice how (*as you have pointed out to students in earlier sessions) you are addressing those online individually by name EVERYTIME, but rarely (if at all) do you use a name of a student in the room :) when they respond or ask a question.

[STEPHEN ROWE]

Adv & Disadvantage of networking slide is another example of where you might use the empty box tool to emphasise the section you are talking to (and still use the pointer) ... pout a box around the Advantages and point to each one; when done move the box down around disadvantage and use the pointer for each one again ... just adds a little more visual stimulation. Alternative ... is a filled in box to cover the disadvantages and delete it when you are ready to speak to them (or move it up to cover the advantages). Options, usually several for any one task :).

[STEPHEN ROWE]

Suggestion: when Hassan asked about relying on machines, perhaps that is an example of an excellent question top throw to the class to invite them, to contribute? I think there might be some good variation to explore (of course, time may have been an issue, but it struck me a really good question to emphasise your point about productivity being both an adv and a disadvantage? Always easier in hindsight :(.

[STEPHEN ROWE]

Alternative ways to present tutorials questions/answers for Topic 4 apply at the end of this section also ... good to ask Harsh to "hold back" and that reinforces the point from last session about "allocating" various questions to different sections of the class (rooms) to share the opportunities around :). Good to have another example with students in each location to demonstrate that the point remains valid. Notice again how you freely use names for those online but not when responses are provided from those in the f-2-f room (usually:).

[STEPHEN ROWE]

By now you will be aware that you can alter the slide directly to correct any errors or typos you notice :) (in this case the comment was prompted by Wireless NIC and Wireless Access Point. Suggest good to have in chat, but more "obvious" on the whiteboard.

---------- End of Peer Debrief Transcript#3 ----------

APPENDIX V4 - Peer Debrief Transcript#4 (October 2012)

[BUS017 SYNCHRONOUS SESSION 5 TUE 30OCT12 11:30AM TO 3PM]

[30 October 2012]

[STEPHEN ROWE]

Topic 7 - learning summary

[STEPHEN ROWE]

Nice to point out how the recording offers an asynchronous record for review of the session when there may be technical difficulties.

[STEPHEN ROWE]

Again suggest thinking about how you might use the filled in box tool to provide a clearer focus when you have a "busy" (full) detailed slide like this one.

[STEPHEN ROWE]

Suggestion: choose two of the Topics and have all the keywords for those on the whiteboard ... rearrange the keywords on the whiteboard under the two Topic headings , THEN add the "new" page references AND THEN go to the completed sheet ... give students a sense of how the Table is developed to encourage them to think about doing their own? There are a range of variations on this you could use as well. Of course, go through he remainder as in the summary due to time constraints.

[STEPHEN ROWE]

Example of variation ... could have Topic column blank with each name of the topic as a whiteboard object (text) and ask a student to move a word to the relevant line matching the Keywords etc and then have the rest of the student complete a poll to agree or disagree (I would offer a virtual reward ... ice cream or mango image if they get it correct :).

[STEPHEN ROWE]

Could do the same by having the key words as an image to move ... you get the idea.

[STEPHEN ROWE]

Once you moved to second page and there was very little response to your question - that would raise some concern for me that the students in the lab were logged on but not "there" or doing other things? I think this highlights the challenge and benefit of using regular polls (and/or chat

responses that you have been doing mostly) as some indication that they are "present" and paying attention??

[STEPHEN ROWE]

I LOVED the question and subsequent exchange about the access to SIM system for altering marks ... LOL. I might have added a comment about consequences :) ... probable expulsion when caught.

[STEPHEN ROWE]

Think about having an animated gif to drop on the screen to thank students online (or some image) ... hand clap ... a BIG thank you ... I guess I am saying that you have a lot more scope to use the features of the whiteboard and invite students to do so also.

---------- End of Peer Debrief Transcript#4 ----------

APPENDIX V5 - Peer Debrief Transcript#5 (October 2012)

[BUS017 SYNCHRONOUS SESSION 6 TUE 6NOV12 11:30AM TO 3PM]

[6 November 2012]

[STEPHEN ROWE]

Session 6, Topic 8

[STEPHEN ROWE]

The delay might have been the connection BUT remember you are asking a LOT of it :) ... talking, video and app sharing :) ... requires quite a large pipe! A tip for app sharing to minimise refresh need is to use page up/down keys to navigate around rather than the scroll ... each scroll is a refresh while each page "turn" is only one.

[STEPHEN ROWE]

I am a big fan of sharing the feedback so the positives and not so positive are available for ALL to learn from.

[STEPHEN ROWE]

I know we discussed the "black box" issue during my visit so no need to go over that.

[STEPHEN ROWE]

Suggestion that some comments in previous session notes will also be useful for way to present your slides and navigate through the material on each one for this session - so I will not repeat them.

[STEPHEN ROWE]

Very good to see the number of students continuing to turn up in the lab for your sessions.

[STEPHEN ROWE]

Notice that students starting to "explore" some of the whiteboard tools on the Adv/Disadvantage slide :) ... dots and small black and yellow marks.

[STEPHEN ROWE]

For input (I am making this at your slide on Concurrency controls) and attention, perhaps think about inserting a poll to break up the "lecture" and ask for understanding of a term or concept?

THEN you can discuss the "answer" by showing your slide with the definition and you will get some sense of their level of attention and potential misunderstanding?

[STEPHEN ROWE]

What is the restriction on them using their audio in the lab? Why do they not use them to contribute by voice if they have a headset?

[STEPHEN ROWE]

I have a slide with animated gifs that might be good to try to gauge the views of the online group (and those in the f-2-f room by show of hands) .... made this comment during your (excellent repartee after the break before you actually started the tutorial. I have some recollection of us discussing this and it might have been by design that you did not want them using audio until the final session.

[STEPHEN ROWE]

Notice how when you were asking about QBE and then its meaning, the way the f-2-f group waited until the online group had added the answers in chat before they responded :) ... you are aware of this challenge based on your efforts in earlier sessions and this simply highlights the challenge of the blended sessions and the ways students very quickly work out where the "answers" come from ... in pure f-2-f this is the "default" provided by those "at the front" or with the loudest voices :). Remains an interesting challenge to manage and strategise!

[STEPHEN ROWE]

Nice to see the effort to restrict which group should answer which question as I had noted earlier - suggest this evidences a similar level of reflection by yourself as I was doing earlier. I find this interesting as it makes sense (to me) to be a "natural" result of the self-reflection by reviewing the recordings :). But it remains powerful to see the "evidence inaction" as it were!

---------- End of Peer Debrief Transcript#5 ----------

APPENDIX V6 - Peer Debrief Transcript#6 (October 2012)

[BUS017 SYNCHRONOUS SESSION 7 THU 8NOV12 11:30AM TO 3PM]

[8 November 2012]

[STEPHEN ROWE]

Topic 9 - SAD and student presentations

[STEPHEN ROWE]

Wondering as you begin your session about online students contributing about the potential for f-2-f students coming out the front and also using your audio to have their input??

[STEPHEN ROWE]

A suggestion for audio in blending ... perhaps not necessary to have ear muffs on ... put them around your collar and adjust the microphone so it is in front of your mouth (or to the side) and then you will be more easily be able to hear in room and still hear if online talk because it comes through the speakers in room.

[STEPHEN ROWE]

Might also remember that you can turn down your audio and have recipients turn their speakers down so that the volume of your voice is less of a concern.

[STEPHEN ROWE]

Nice diagram on RHS for the progress through the phases ... a good development of a simple list of words ... notice how this is an example of earlier comments about how to use the empty box/circle tool on the whiteboard :) - you have just done it in ppt :).

[STEPHEN ROWE]

This could also be applied when emphasising the point on a slide that represents the KEY point that they need to take away (Phase 3 for e.g. about the deliverable ,,, use the circle or square tool to put a red box around it as the key take away from the slide?

[STEPHEN ROWE]

Collaborate is an excellent way to have students demonstrate their prototype to you rather than come along to your office and do it f-2-f??

[STEPHEN ROWE]

When Hasan first spoke, you will notice the echo ... remember in the main room, you need to turn your mic off to avoid the feedback BUT in the later versions this should be less of a trouble because of the improvements in noise cancelling. This was for the student contributions later also ... and the technology improvements (mentioned above) will avoid this issue.

[STEPHEN ROWE]

You will also notice that it is wise to just let the individual talk rather than treat it like a "conversation" and the quality of the sound will be even better ... but still good to hear the students laugh and enjoying the contributions.

[STEPHEN ROWE]

Hopefully we will get to discuss some of these ideas once you have had a time to digest a few of the points I have written about. No rush. Hopefully you find them helpful and of some use in your analysis.

---------- End of Peer Debrief Transcript#6 ----------

APPENDIX W - Meeting Information Report

Blackboard collaborate

Close

Meeting Information Report

There are 2 pages of results.

1 2

Date	Starts	Ends	Name	Type	Hosted By	Version	Rooms	Invitees	Attendees	Recordings	Details
Mon Oct 01 2012	Mon Oct 01 2012 03:15 PM	Mon Oct 01 2012 03:45 PM	BUS017 ISB SYNCHRONOUS SESSION 1 TEST 3 MON 1OCT12 3:15PM TO 3:45PM	NONE	Mr Yeung	11	2	1	3	1	View
Thu Oct 04 2012	Thu Oct 04 2012 10:15 AM	Thu Oct 04 2012 10:45 AM	BUS017 SYNCHRONOUS SESSION ORIENTATION TEST THU 4OCT12 10:15AM - 10:45AM	NONE	Mr Yeung	11	1	1	2	0	View
	Thu Oct 04 2012 11:30 AM	Thu Oct 04 2012 03:00 PM	BUS017 SYNCHRONOUS SESSION ORIENTATION THU 4OCT12 11:30AM TO 3PM	NONE	Mr Yeung	11	2	1	3	0	View
Mon Oct 08 2012	Mon Oct 08 2012 03:15 PM	Mon Oct 08 2012 03:45 PM	SYNCHRONOUS SESSION 1 TEST 1 MON 8OCT12 3:15PM TO 3:45PM	NONE	Mr Yeung	11	2	1	3	0	View
Tue Oct 09 2012	Tue Oct 09 2012 11:30 AM	Tue Oct 09 2012 03:00 PM	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12 11:30AM TO 3PM	NONE	Mr Yeung	11	3	1	23	1	View
Fri Oct 12 2012	Fri Oct 12 2012 02:30 PM	Fri Oct 12 2012 03:30 PM	TEST SESSION WITH MR STEPHEN ROWE FRI 12OCT12 2:30PM TO 3:30PM	NONE	Mr Yeung	11	1	1	2	0	View
Mon Oct 15 2012	Mon Oct 15 2012 11:00 AM	Mon Oct 15 2012 12:00 PM	BUS017 SYNCHRONOUS SESSION 2 TEST MON 15OCT12 11AM - 12PM	NONE	Mr Yeung	11	2	1	3	2	View
Tue Oct 16 2012	Tue Oct 16 2012 09:30 AM	Tue Oct 16 2012 10:15 AM	BUS017 SYNCHRONOUS SESSION 2 TEST 2 TUE 16OCT12 9:30AM - 10:15AM	NONE	Mr Yeung	11	1	1	2	1	View

https://sas.elluminate.com/site/internal/reports/supervisor/meeting/info.csv 19/12/2012

APPENDIX X - Session Attendance Report

Blackboard collaborate

Close

Session Attendance Report

There are 3 pages of results.

1 2 3

Date	Starts	Ends	Name	Duration	Category	Type	Cost Center	Attendees	Details
Mon Oct 01 2012	Mon Oct 01 2012 03:07 PM	Mon Oct 01 2012 03:10 PM	BUS017 ISB SYNCHRONOUS SESSION 1 TEST 3 MON 1OCT12 3:15PM TO 3:45PM	00:03:04	Meeting	NONE	NONE	View (1)	View
	Mon Oct 01 2012 03:20 PM	Mon Oct 01 2012 03:31 PM	BUS017 ISB SYNCHRONOUS SESSION 1 TEST 3 MON 1OCT12 3:15PM TO 3:45PM	00:11:20	Meeting	NONE	NONE	View (2)	View
Thu Oct 04 2012	Thu Oct 04 2012 10:11 AM	Thu Oct 04 2012 10:27 AM	BUS017 SYNCHRONOUS SESSION ORIENTATION TEST THU 4OCT12 10:15AM - 10:45AM	00:15:55	Meeting	NONE	NONE	View (2)	View
	Thu Oct 04 2012 11:04 AM	Thu Oct 04 2012 12:37 PM	BUS017 SYNCHRONOUS SESSION ORIENTATION THU 4OCT12 11:30AM TO 3PM	01:32:16	Meeting	NONE	NONE	View (2)	View
	Thu Oct 04 2012 02:42 PM	Thu Oct 04 2012 02:56 PM	BUS017 SYNCHRONOUS SESSION ORIENTATION THU 4OCT12 11:30AM TO 3PM	00:13:21	Meeting	NONE	NONE	View (1)	View
Mon Oct 08 2012	Mon Oct 08 2012 03:15 PM	Mon Oct 08 2012 03:24 PM	SYNCHRONOUS SESSION 1 TEST 1 MON 8OCT12 3:15PM TO 3:45PM	00:08:49	Meeting	NONE	NONE	View (1)	View
	Mon Oct 08 2012 03:33 PM	Mon Oct 08 2012 03:43 PM	SYNCHRONOUS SESSION 1 TEST 1 MON 8OCT12 3:15PM TO 3:45PM	00:10:15	Meeting	NONE	NONE	View (2)	View
Tue Oct 09 2012	Tue Oct 09 2012 11:03 AM	Tue Oct 09 2012 11:07 AM	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12 11:30AM TO 3PM	00:04:11	Meeting	NONE	NONE	View (1)	View
	Tue Oct 09 2012 11:08 AM	Tue Oct 09 2012 11:11 AM	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12 11:30AM TO 3PM	00:02:32	Meeting	NONE	NONE	View (1)	View
	Tue Oct 09 2012 01:06 PM	Tue Oct 09 2012 02:30 PM	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12 11:30AM TO 3PM	01:23:22	Meeting	NONE	NONE	View (21)	View
Fri Oct 12 2012	Fri Oct 12 2012 02:27 PM	Fri Oct 12 2012 03:54 PM	TEST SESSION WITH MR STEPHEN ROWE FRI 12OCT12 2:30PM TO 3:30PM	01:26:42	Meeting	NONE	NONE	View (2)	View
Mon Oct 15 2012	Mon Oct 15 2012 10:54 AM	Mon Oct 15 2012 11:31 AM	BUS017 SYNCHRONOUS SESSION 2 TEST MON 15OCT12 11AM - 12PM	00:36:54	Meeting	NONE	NONE	View (1)	View
	Mon Oct 15 2012 11:33 AM	Mon Oct 15 2012 12:03 PM	BUS017 SYNCHRONOUS SESSION 2 TEST MON 15OCT12 11AM - 12PM	00:29:35	Meeting	NONE	NONE	View (2)	View
Tue Oct 16 2012	Tue Oct 16 2012 09:32 AM	Tue Oct 16 2012 10:01 AM	BUS017 SYNCHRONOUS SESSION 2 TEST 2 TUE 16OCT12 9:30AM - 10:15AM	00:29:39	Meeting	NONE	NONE	View (2)	View
	Tue Oct 16 2012 11:07 AM	Tue Oct 16 2012 11:09 AM	BUS017 SYNCHRONOUS SESSION 2 TUE 16OCT12 11:30AM TO 3PM	00:02:01	Meeting	NONE	NONE	View (1)	View

1 2 3

APPENDIX Y - Attendance List Report

Close

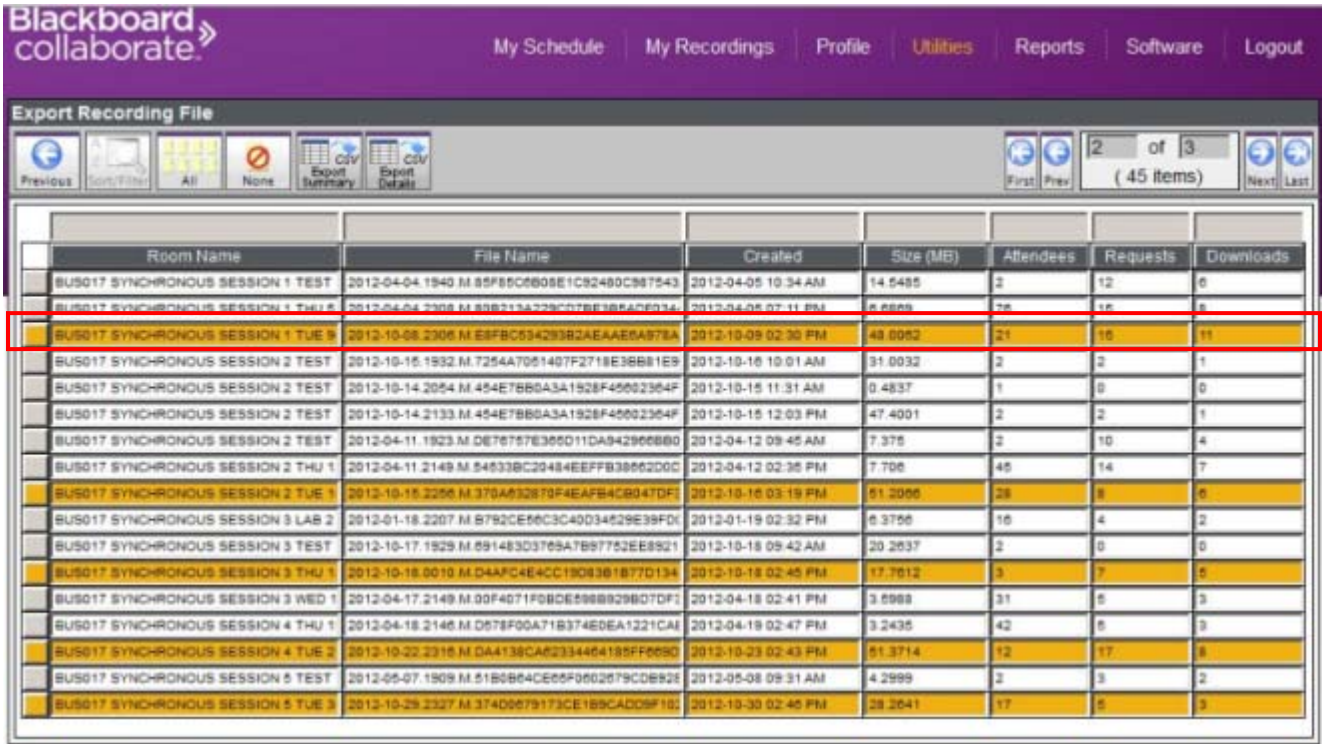
Attendee List

BUS017 SYNCHRONOUS SESSION 1 TUE 90CT12 11:30AM TO 3PM

Attendee	Attendee Name	Authentication	Is Chair	Is User	Launch Count	First Join	Last Leave	Total Active	Log(s)
1		(Non-Chair Password)	No	No	1	2012-10-09 01:48 PM	2012-10-09 02:23 PM	00:35:24	View (1)
2		(Non-Chair Password)	No	No	1	2012-10-09 01:41 PM	2012-10-09 02:26 PM	00:44:53	View (1)
3		(Non-Chair Password)	No	No	1	2012-10-09 01:48 PM	2012-10-09 02:25 PM	00:36:58	View (1)
4		(Non-Chair Password)	No	No	1	2012-10-09 01:27 PM	2012-10-09 02:28 PM	01:00:56	View (1)
5		(Non-Chair Password)	No	No	1	2012-10-09 01:40 PM	2012-10-09 02:24 PM	00:44:18	View (1)
6		(Non-Chair Password)	No	No	1	2012-10-09 01:38 PM	2012-10-09 02:24 PM	00:46:21	View (1)
7		(Non-Chair Password)	No	No	1	2012-10-09 01:33 PM	2012-10-09 02:23 PM	00:50:08	View (1)
8		(Non-Chair Password)	No	No	1	2012-10-09 01:31 PM	2012-10-09 02:25 PM	00:54:03	View (1)
9		(Non-Chair Password)	No	No	1	2012-10-09 01:44 PM	2012-10-09 02:24 PM	00:39:18	View (1)
10		(Non-Chair Password)	No	No	1	2012-10-09 01:38 PM	2012-10-09 02:25 PM	00:46:46	View (1)
11		(Non-Chair Password)	No	No	1	2012-10-09 01:40 PM	2012-10-09 02:25 PM	00:44:20	View (1)
12		(Non-Chair Password)	No	No	1	2012-10-09 01:47 PM	2012-10-09 02:26 PM	00:38:41	View (1)
13		(Non-Chair Password)	No	No	1	2012-10-09 01:58 PM	2012-10-09 02:24 PM	00:25:36	View (1)
14		(Non-Chair Password)	No	No	1	2012-10-09 01:23 PM	2012-10-09 02:25 PM	01:01:29	View (1)
15		(Non-Chair Password)	No	No	1	2012-10-09 01:58 PM	2012-10-09 02:23 PM	00:25:24	View (1)
16		(Invitee UID)	Yes	Yes	1	2012-10-09 01:06 PM	2012-10-09 02:22 PM	01:16:08	View (1)
17		(Non-Chair Password)	No	No	1	2012-10-09 01:55 PM	2012-10-09 02:25 PM	00:29:55	View (1)
18		(Non-Chair Password)	No	No	1	2012-10-09 01:28 PM	2012-10-09 02:25 PM	00:56:05	View (1)
19		(Non-Chair Password)	No	No	1	2012-10-09 01:23 PM	2012-10-09 02:25 PM	01:02:45	View (1)
20		(Non-Chair Password)	No	No	1	2012-10-09 01:42 PM	2012-10-09 02:25 PM	00:42:41	View (1)
21		(Non-Chair Password)	No	No	1	2012-10-09 01:46 PM	2012-10-09 02:25 PM	00:39:23	View (1)

Back

APPENDIX Z - Export Recording File Report



APPENDIX AA - Recording Access Log

	A	B	D	E	F	G	H
1	Room Name	Owner Name	Created	Size (MB)	Requested	Downloaded	IP Address
2	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	09/10/2012 15:05	UNINITIALIZED	202.172.246.7
3	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	09/10/2012 15:06	09/10/2012 15:06	202.172.246.7
4	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	09/10/2012 15:57	UNINITIALIZED	202.172.246.7
5	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	09/10/2012 15:57	09/10/2012 15:57	202.172.246.7
6	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	11/10/2012 13:23	11/10/2012 13:23	202.172.246.7
7	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	14/10/2012 23:25	14/10/2012 23:27	222.165.97.89
8	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	14/10/2012 23:29	14/10/2012 23:32	58.182.53.37
9	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	14/10/2012 23:49	UNINITIALIZED	58.182.53.37
10	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	14/10/2012 23:53	14/10/2012 23:54	58.182.53.37
11	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	16/10/2012 0:26	UNINITIALIZED	182.55.169.10
12	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	16/10/2012 0:26	16/10/2012 0:32	182.55.169.10
13	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	16/10/2012 20:19	16/10/2012 20:20	121.7.224.147
14	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	14/11/2012 11:39	14/11/2012 11:40	42.61.33.156
15	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	15/11/2012 11:21	15/11/2012 11:21	42.61.33.156
16	BUS017 SYNCHRONOUS SESSION 1 TUE 9OCT12	MR_YEUNG	09/10/2012 14:30	48.0062	26/11/2012 10:34	26/11/2012 10:35	203.2.35.163
17							

APPENDIX AB - Athabasca University Research Ethics Board Approval Letter

MEMORANDUM

Athabasca University
Canada's Open University

DATE: August 31, 2012

TO: Sze Kiu Yeung

COPY: Dr. Mohamed Ally (Research Supervisor)
Janice Green, Secretary, Athabasca University Research Ethics Board
Dr. Simon Nuttgens, Chair, Athabasca University Research Ethics Board

FROM: Dr. Rick Kenny, Chair, CDE Research Ethics Review Committee

SUBJECT: **Ethics Proposal #CDE-12-03: *"Synchronous Computer-mediated Instruction: Toward a Pedagogical Model for Effective Distributed Learning"***

The Centre for Distance Education (CDE) Research Ethics Review Committee, acting under authority of the Athabasca University Research Ethics Board to provide a process of review for minimal risk student researcher projects, reviewed the above-noted proposal and supporting documentation.

Thank you for providing revised documentation requested by the CDE Ethics Review Committee in Dr. Kenny's e-mail of August 28, 2012, as well as your follow-up to that committee's subsequent requests. Your cooperation in editing to incorporate suggested changes was greatly appreciated.

On behalf of the CDE Research Ethics Review Committee, I am pleased to confirm that this project has been granted **FULL APPROVAL** on ethical grounds, and you may proceed as outlined in the revised proposal which you provided August 29, 2012.

The approval for the study is **valid for a period of one year from the date of this memo** (to August 31, 2013, as requested). If required, an extension must be sought in writing prior to the expiry of the existing approval. **A Final Report is to be submitted when the research project is completed.** The reporting form can be found online at http://www.athabascau.ca/research/ethics/ .

As implementation of the proposal progresses, if you need to make any significant changes or modifications, please forward this information immediately to the CDE Research Ethics Review Committee via rebsec@athabascau.ca , for further review.

This approval of your application will be reported to the Athabasca University Research Ethics Board (REB) at their next monthly meeting. The REB retains the right to request further information, or to revoke approval at any time.

If you have any questions, please do not hesitate to contact Janice Green at janicegr@athabascau.ca or rebsec@athabascau.ca .

Centre for Distance Education Research Ethics Review Committee
(A Sub-Committee of the Athabasca University Research Ethics Board)
1 Athabasca Drive, Athabasca, AB, Canada T9S 3A3
e-mail: janicegr@athabascau.ca
Telephone: (780) 675-6718
Fax: (780) 675-6722

APPENDIX AC - Student Information Letter

1April 2013

Dear Students

LETTER OF INFORMATION

Project Title: Synchronous Computer-mediated Instruction: Toward a Pedagogical Model for Effective Distributed Learning

Researcher and Sponsoring Institution: Mr. Yeung Sze Kiu, SIM University

Objective: This research study in education aims to investigate the benefits of synchronous computer-mediated instruction (synchronous learning) with a group of learners in the face-to-face, classroom environment of SIM University. The researcher is undertaking this study as part of his doctoral study in *Distance Education* with Canada's Athabasca University.

Method: The Blackboard Collaborate Web Conferencing v12 (Bb Collaborate v12) system will be used for synchronous learning for a class of students taking the *Information Systems for Business (BUS017)* course in the *Diploma in Management Studies (DMS)* programme. This class of students will be taught by the instructor (researcher) using the same course materials as other students in the BUS017 cohort except that some of their lessons will be conducted as synchronous learning in the labs at SIM University.

Purpose: The purpose is to introduce students the experience of synchronous learning and to determine if this kind of teaching and learning practice is effective as well as exploring a suitable pedagogical model in support of synchronous learning.

Invitation: You are invited to take part in this research study. The number of participants required is 50% of the class-size and your participation is purely voluntary (i.e. you are not required to participate if you do not wish to do so). You may withdraw anytime during the semester, before the start of data analysis in the fourth month of this research study, without adverse impact on your course of study. Your participation or non-participation in this study will not affect the outcome of your own study (i.e. your BUS017 course grades will not be affected).

Duration: The overall duration of this study is 6 months. However, the actual duration of synchronous learning is over the 7-week teaching period of the DMS semester (3 months). A survey will be conducted at the end of the semester and some participants will be invited for interviews within 3 months after the end of semester. Not all participants are required to attend interviews.

What would I have to do? If you agree to take part, you will be given a USB Headset on loan provided by SIM University. For those BUS017 lessons in which the instructor/researcher plans to conduct synchronous learning, you will need to go to the lab, put on your headset and login to the synchronous system (Blackboard Collaborate). Training in using the headset and Blackboard Collaborate will be given to you by the instructor/researcher. There will be a maximum of eight (8) synchronous-learning sessions and the duration of each session is approximately 1 hour. At the end of the semester, a survey will be given out to you to find out about your experience of synchronous learning. Some participants will be invited to attend an interview with the Research Assistant. In addition, your end-of-semester course results will be accessed for data-analysis and that your personal course record will remain confidential.

Data security: Data relating to your participation in this research study will be kept securely inside the instructor/researcher's office at SIM University. Hardcopies will be kept on file in a locked cabinet while softcopies will be password-protected and stored on the instructor/researcher's office computer. All data

will be destroyed within 1 year after the researcher completes this study. Hardcopies will be shredded through a shredding machine while softcopies will be deleted from the researcher's office computer. Archived softcopy data on CD will be cut by the researcher.

What are the risks involved? None

Will I benefit from this research? Yes. Students who participate will acquire synchronous learning experience and skills in using the latest web-conferencing system. This experience will be useful to their future learning needs as this kind of learning system is increasingly common among higher education institutions worldwide.

Do I have to participate? Participation is voluntary.

What else does my participation involve? None

Will I be paid for participating, or do I have to pay anything? No. SIM University will provide the lab and computer resources including training and access to Bb Collaborate v12. In additional, each student will also be given a USB headset on loan for the duration of the research study.

Will my record be kept private? Yes.

If I suffer a research-related injury, will I be compensated? Participation in this research exercise is totally risk-free. It is highly unlikely that you will get injured while attending a lesson in synchronous learning. As such, no compensation will be provided by SIM University or the Researcher.

Publication: The existence of the research will be listed as an abstract, available online through the Athabasca University Digital Thesis and Project Room (DTPR), and the final research paper will be publicly available.

If you have any further questions or want clarification regarding this research or your participation, please contact:

Researcher: Mr. Yeung Sze Kiu (skyeung@unisim.edu.sg; 62489646)
Research Assistant: Miss. Naajneen D/O Jabarudeen (naaj_jabar@yahoo.com.sg; 83991829)

Final note: The Athabasca University Research Ethics Board has reviewed this research study and may be reached by e-mailing rebsec@athabascau.ca or calling 1-780-675-6718 if you have questions or comments about your treatment as a participant.

If you would like to take part in this research study, please read and sign the consent form on the next page and submit it to the drop box labeled "Participant Consent Form" located at Level 2 Atrium, Block A, SIM University, before the 2nd Briefing Session.

APPENDIX AD - Consent Form

CONSENT: **April 2013 Semester**

I have read this Letter of Information and have had any questions answered to my satisfaction, and I will keep a copy of this letter for my records. My signature below is meant to confirm that:

- I understand the expectations and requirements of my participation in the research;
- I understand the provisions around confidentiality and anonymity;
- I understand that my participation is voluntary, and that I am free to withdraw at any time during the semester with no negative consequences;
- I understand that the researcher will not know about my participation until after I have graduated from the DMS programme.
- I am aware that I may contact someone in addition to the researcher if I have any questions, concerns or complaints about the research procedures;

Participant Name:_____ Student ID:_____

Participant Signature: _____ Date:_____

_____(please initial). I am granting permission for the Research Assistant to conduct an interview with me, if invited, at the end of the semester.

APPENDIX AE – Blackboard Letter about Hackers attacking Collaborate

From: BLACKBOARD COLLABORATE [bbcollabsupport-notifications@blackboard.com]
Sent: Saturday, February 16, 2013 6:04 AM
To: Yeung Sze Kiu (UniSIM)
Subject: Message from President of Bb Collaborate

A message from BLACKBOARD COLLABORATE SUPPORT

Blackboard collaborate.

Blackboard Collaborate Customers and Partners,

I write today to acknowledge that over the past several weeks your Blackboard Collaborate web conferencing experience may have been below the high standard you expect from us. I speak for the entire Collaborate organization when I say that we are deeply sorry for this, and we are totally committed to returning our service to the expected levels. We thank you for your patience as we work to return this important service to the high level of performance you've come to enjoy.

Let me start with an executive summary of what's occurring. Collaborate has been subjected to a series of distributed denial-of-service attempts, or DDoS. During these events a large number of connections flood our systems, draining resources and causing unpredictable behavior for end users. Given the synchronous nature of our solutions, the impact to our service is much more noticeable and impactful.

It's important to note that at no time have our systems been compromised nor has the Collaborate application failed. Rather, network congestion caused by the DDoS attempts has prevented our community from enjoying typical levels of performance.

We have now researched and tested a path to resolution. We have already taken steps to shorten the duration of the disruptions and are implementing a plan to prevent them altogether. It requires that we filter all traffic, and sort out the bad DDoS requests from the good client traffic. As we implement these changes, there may be some temporary and relatively minor performance degradation, but we expect it to be a small inconvenience that allows us to confidently restore consistent and reliable service by early March.

A critical step in our path to a comprehensive solution will require an assist from Collaborate systems administrators. We've emailed information about a required configuration change to Collaborate administrators of record earlier today (Knowledge Base Article 2796). We typically provide a month buffer to allow you to prepare for a system change. Under these urgent circumstances we are informing you of this change with 2 weeks notice, along with your understanding as a business partner in why we've suspended our usual protocol. To be very clear: the configuration change must be made to avoid service interruption. Our request is that you confirm with your systems administrator that they're aware and are making appropriate preparations. Know that our support organization will be available 7x24 to assist your team should it be required.

I want to extend our sincere apologies to not only our customers, but also to the impacted teachers and the students for the resultant service disruptions that these DDoS attempts have caused. Every student deserves the best educational experience each and every day, and we take our responsibility to facilitate that experience seriously.

If you have questions or want to provide feedback directly related to this topic, please contact us at collaborateconfidently@blackboard.com.

Thank you for your patience and understanding.

Sincerely,

Maurice Heiblum
President, Blackboard Collaborate

APPENDIX AF – Reflective Journal on Remote Desktop Support

Remote desktop support (RDS) refers to the use of one computer (A) to take over the control of another computer (B) in order to perform some activities on B remotely from A. The objective of performing this kind of investigation is to determine the feasibility of providing students with direct, one-to-one support remotely, in real-time, as part of the overall research problem. In particular, the study examined (1) the technology of RDS, (2) the application of RDS in SIM University's computing environment, and (3) the pedagogical consideration associated with RDS. Specifically, RDS may be implemented at two levels: (a) at the level of the operating system (Windows), and (b) at the level of the synchronous web conferencing application (Blackboard Collaborate).

RDS implementation in Windows. Various kinds of RDS technology are available on the market today. They range from the sophisticated and expensive systems such as Teradici (www.teradici.com) and TeamViewer (www.teamviewer.com) to the common, basic applications. The RDS technology adopted in this study is one that meets the criteria of fit-for-purpose, availability, and cost. Specifically, the Windows Remote Desktop (WRD) application is chosen because of UniSIM's Windows-based computing environment and that WRD is already available at no extra cost as it is part of the Windows operating system.

RDS technology was implemented in the first lab session of the April 2013 semester which took place on 5 April in Lab 2.23 and Lab 3.35 simultaneously. The class was divided into two groups with the student-participants (treatment group) based in Lab 2.25 while the instructor and the non-participating students (control group) in Lab 3.35. A student-participant in Lab 2.35 volunteered to participate in this investigation by making his computer (B) available for remote access by the instructor using his computer (A) located in Lab 3.35. The rest of the student-participants in Lab2.35 attended the lab by logging into a pre-scheduled synchronous session using the Blackboard Collaborate web-conferencing system while the instructor login from Lab3.35. The students in the control group, located in Lab3.35, did not use/login Collaborate but instead watched the instructor's computer projected on the large, wall-mounted whiteboard. A remote connection was successfully established by the instructor using Computer A to access the participant-volunteer's Computer B via Windows Remote Desktop. It followed that Computer B (participant's computer located in Lab2.35) appeared as a new window on Computer A (instructor's computer located in Lab3.35) and the instructor was able to use Computer A to take over the control of Computer B (see Figure 1).

Figure 1: Establishing Remote Connection between Computers A & B via Windows Remote Desktop

However, a limitation of the Windows Remote Desktop application is that when Computer B surrenders control to Computer A, the former screen is locked and the participant-volunteer would only see a locked screen on his Computer B (see Figure 2).

Figure 2: Participant-volunteer's Computer B with Screen locked

In order for the participant-volunteer to see his Computer B (now controlled by Computer A), he was told by the instructor to shift one seat either to his right or left in Lab2.35 and to use a spare computer (C) next to his original computer (B) to login to Collaborate. When the participant-volunteer had properly joined the synchronous session using Computer C, the instructor shared the entire desktop of his Computer A via Collaborate's Application Sharing function. All the student-participants in Lab2.35 were able to see the instructor's Computer A controlling Computer B in their synchronous session including the participant-volunteer who, by

now, was viewing it on Computer C. The use of a “third” computer (C), therefore, provided a way for the participant-volunteer to see his original Computer B surrendering control to Computer A thus overcoming Windows Remote Desktop's locked-screen problem (see Figure 3).

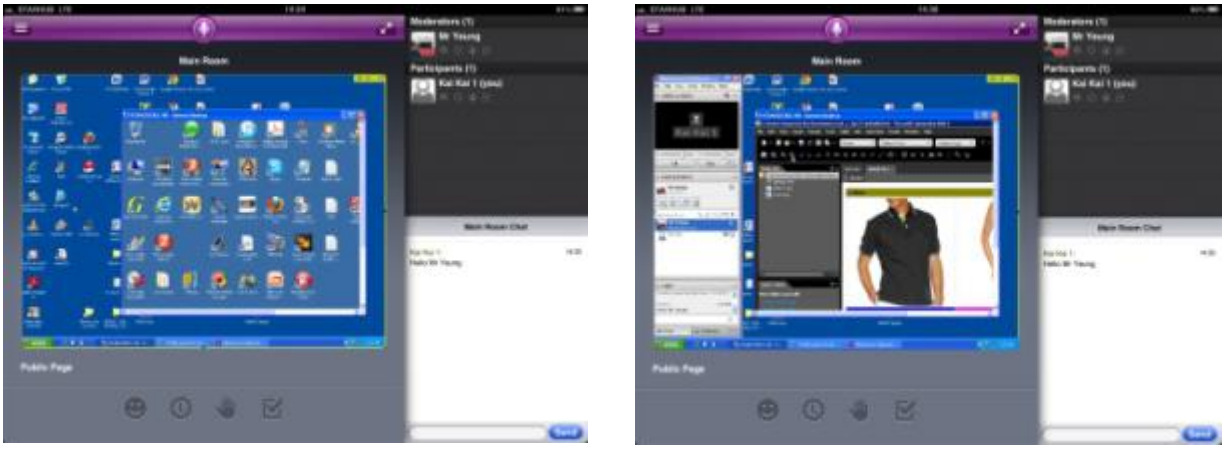


Figure 3: Computer C being used by Participant-volunteer to view his original Computer B being remotely controlled by Computer A.

From technology to pedagogy, the next step was to identify a set of authentic tasks that could be performed on Computer B remotely from Computer A and, accordingly, the instructor showed the participant-volunteer how to complete the lab exercise by constructing the 'A-Mart' homepage using Microsoft Expression Web 3.0. Figure 4 shows the instructor demonstrating to the participant-volunteer how to select menus for drawing a straight line followed by entering the homepage's e-mail address and other details.

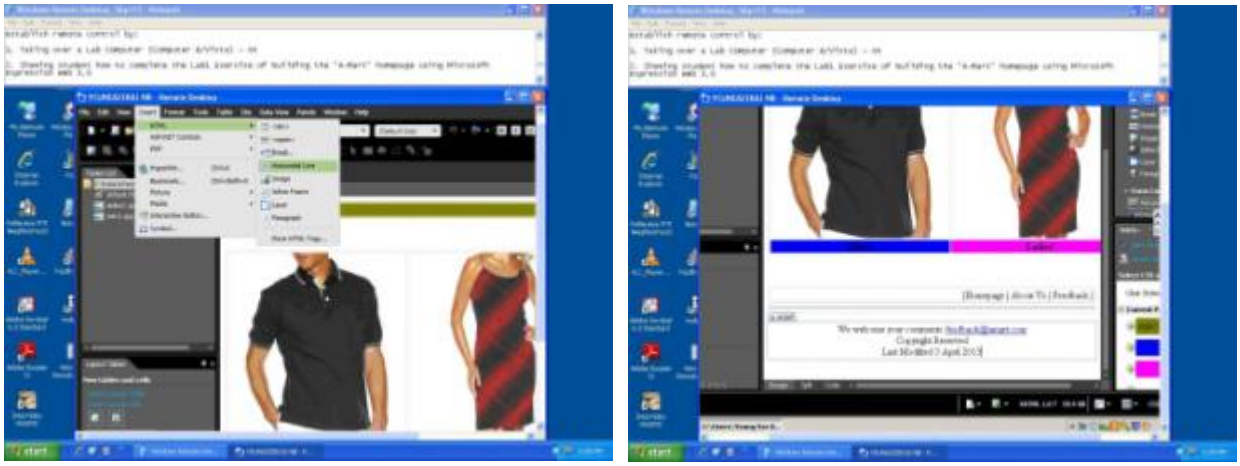


Figure 4: Web-site design using Microsoft Expression 3.0 on Computer B remotely controlled by Computer A

Finally, the instructor showed the completed homepage of 'A-Mart' on both the IE8 web-browser and Microsoft Expression Web (Figure 5).

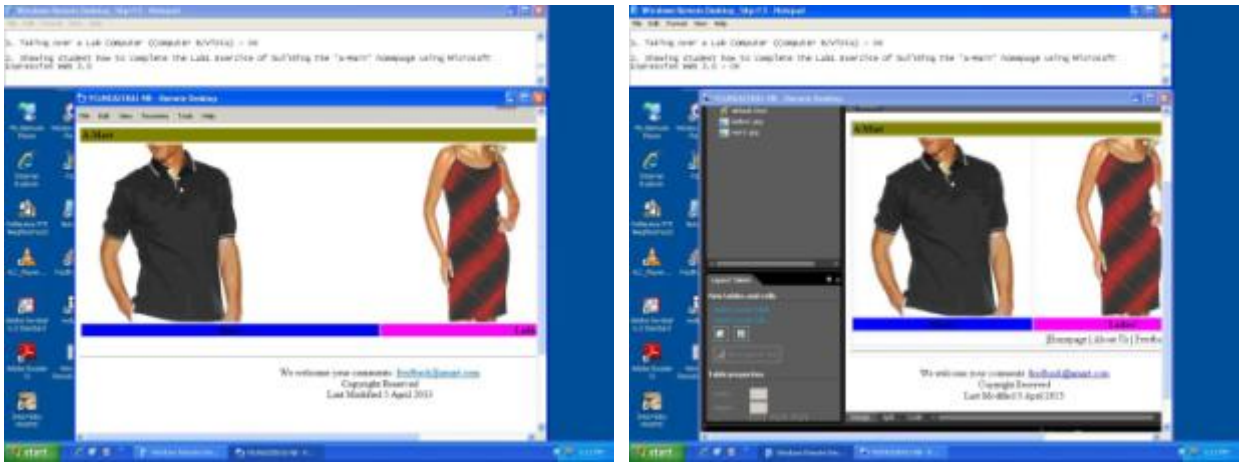


Figure 5: Web-site homepage on Computer B remotely controlled by Computer A

RDS implementation in Blackboard Collaborate. Alternatively, a simpler and neater way to implement RDS is to use the actual synchronous web-conferencing system (Blackboard Collaborate). This method was only discovered after the study had been completed. As in the case with the Personal Learning Assistant, it came about rather serendipitously during the researcher-instructor's synchronous online presentation in the Athabasca University Faculty of Graduate Studies (FGS) Conference at Edmonton, Canada, on 14 September 2013, 12:15pm (Edmonton Time)/15 September 2013, 2:15am (Singapore Time). Despite having earlier submitted his presentation in PDF format to AU, it was not loaded on Adobe Connect, AU's synchronous web-conferencing system, for presentation by the researcher-instructor. Instead, he was asked to share a version of the presentation from his computer connected to Adobe Connect from Singapore. This was the first time he had attempted application sharing on Adobe Connect as he had always presented his presentation via the pre-load method. The researcher-instructor went ahead and shared the entire desktop of his computer from Singapore to Edmonton through Adobe Connect. It worked well and after the presentation, the researcher-instructor received a message from a participant requesting access to his computer. He declined the request but it made him realise Adobe Connect's remote desktop access capability. Logically, this capability should also be available on Blackboard Collaborate. A test was conducted on 16 September with two computers and, indeed, computer (A) could remotely access and control computer (B). Details of the steps involved together with a screenshot of the test session are illustrated in the Annex. A second test involving three computers replicating the above web-page development exercise is shown in Figures 6.

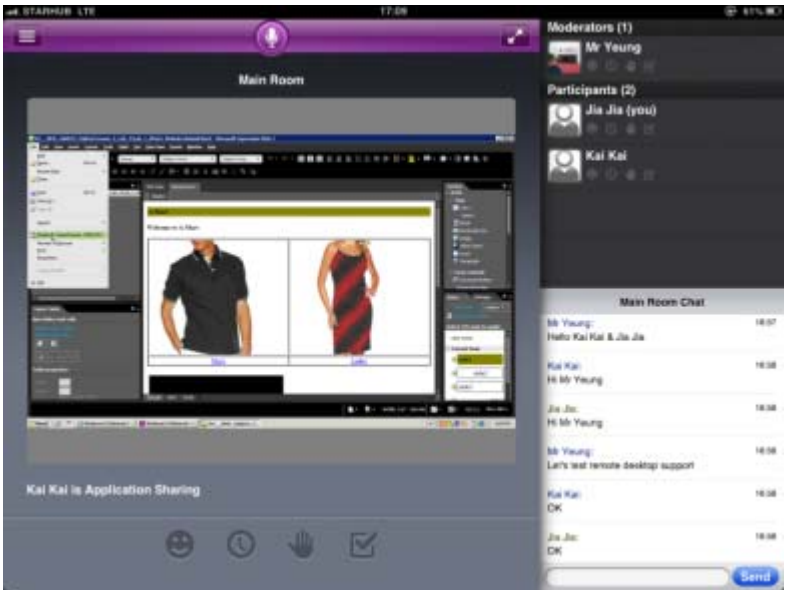
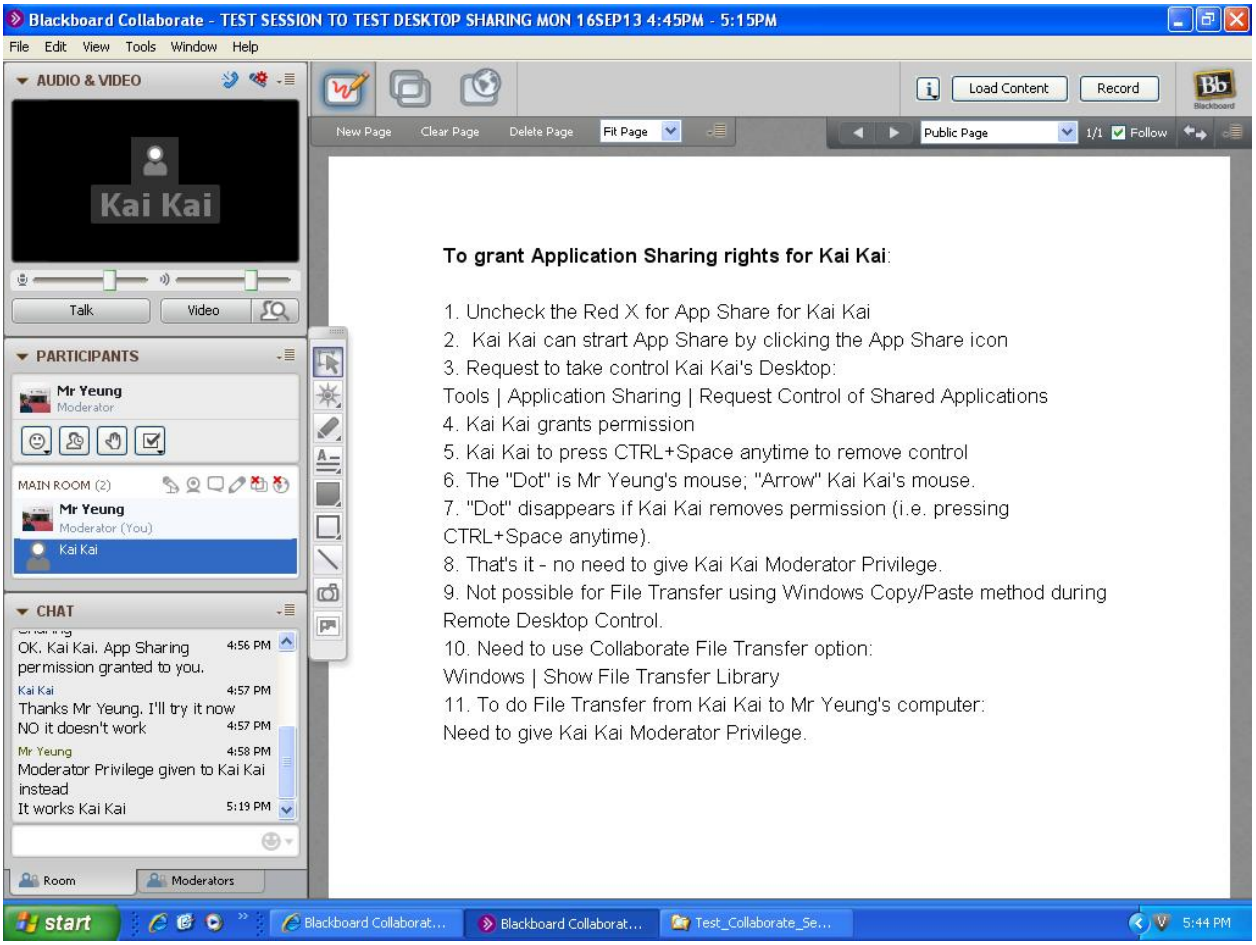


Figure 6: Computer C showing Computer B being remotely controlled by Computer A

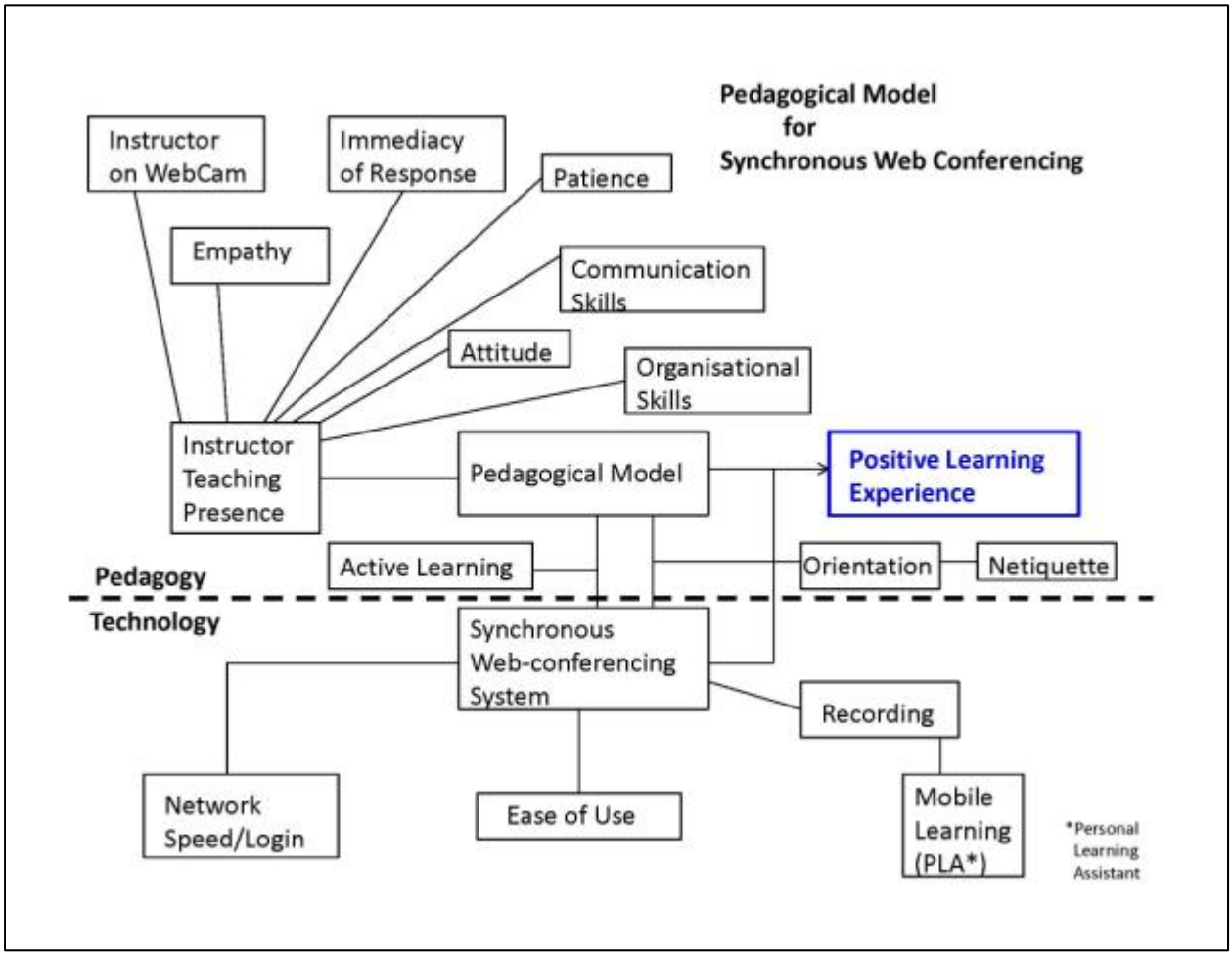
In summary, through the use of Remote Desktop Support technology in UniSIM's computing environment, the instructor demonstrated the feasibility and flexibility of remotely taking control of Computer B (participant-volunteer) in real time from his Computer A located on a different floor of the university campus. An authentic activity in the form of an actual lab exercise was performed by the instructor on Computer B from Computer A. The use of Computer C by the participant-volunteer to view Computer B via Blackboard Collaborate provided a way to overcome the locked-screen problem on Computer B caused by Windows Remote Desktop. At the application level, RDS was also tested in Blackboard Collaborate and it offered advantages over Windows that include (i) no screen-lock up, and (ii) compatibility with wireless connections in both Wi-Fi and 3G networks (RDS in Windows required a wired connection for each participating computer). In terms of establishing remote control, Windows Remote Desktop and Blackboard Collaborate work differently in that Windows requires the Moderator/Instructor to initiate a connection between his/her computer (A) and the participant's computer (B) first before the remote-control session is broadcasted to all the participants by A sharing its desktop through Collaborate. In the case of initiating RDS directly from Collaborate, the Moderator/Instructor has to grant application-sharing privilege to B first before B shares it's desktop to everyone. It is only after B's desktop has been shared then the Moderator/Instructor could send a request from A to B for A to control B (assuming B accepts the request). The fundamental difference between these two approaches is that in Windows, desktop sharing is done by A (Moderator/Instructor) whereas in Collaborate it is B (the participant) who shares the desktop for remote control/support.

---------- End of Reflective Journal ----------

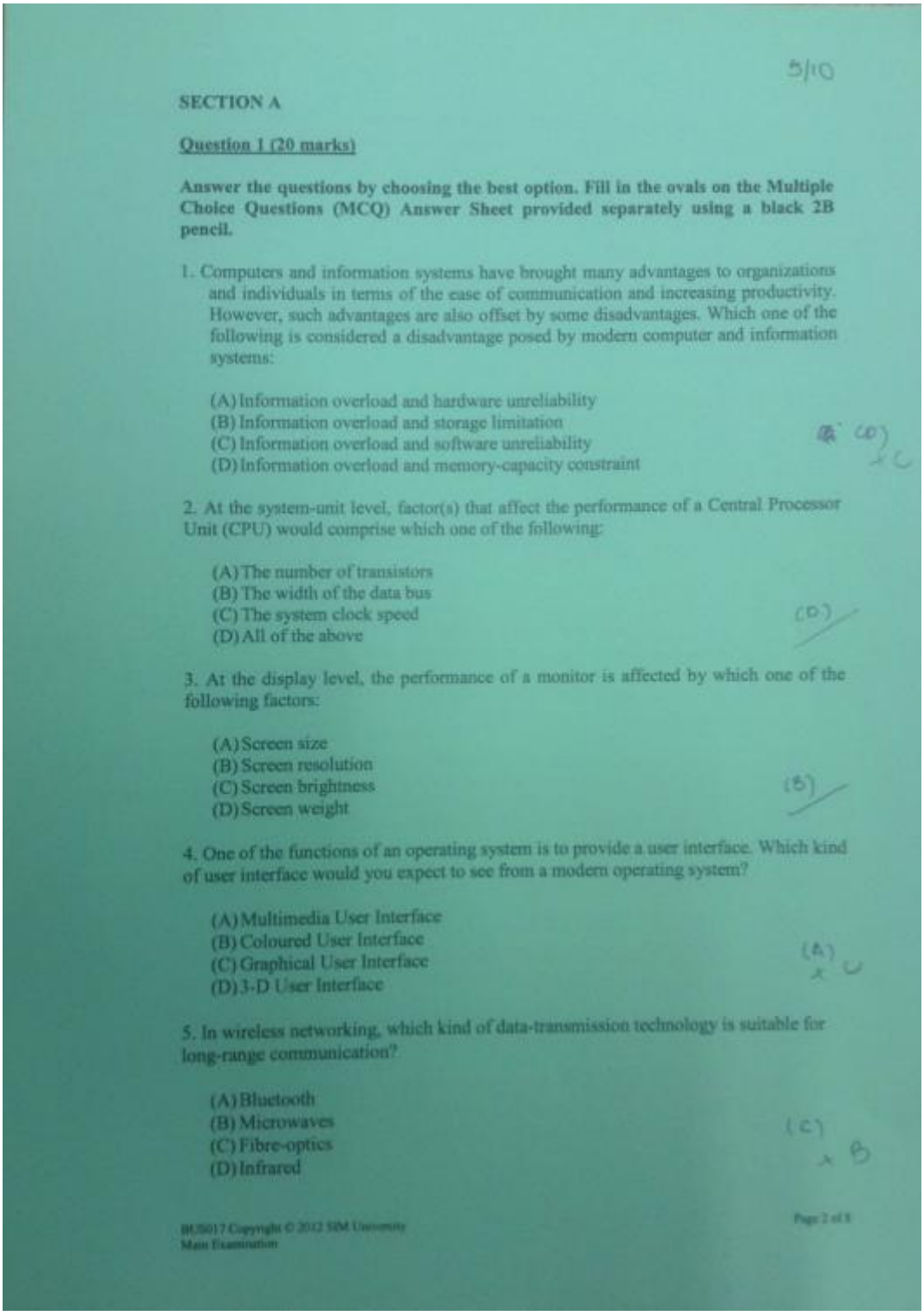
ANNEX – Web-Conferencing Implementation of Remote Desktop Support



APPENDIX AG - Pedagogical Model for Synchronous Web Conferencing



APPENDIX AH – Pretest Question Paper for January 2013 (Part 1 of 2)



5/10

SECTION A

Question 1 (20 marks)

Answer the questions by choosing the best option. Fill in the ovals on the Multiple Choice Questions (MCQ) Answer Sheet provided separately using a black 2B pencil.

1. Computers and information systems have brought many advantages to organizations and individuals in terms of the ease of communication and increasing productivity. However, such advantages are also offset by some disadvantages. Which one of the following is considered a disadvantage posed by modern computer and information systems:

(A) Information overload and hardware unreliability
(B) Information overload and storage limitation
(C) Information overload and software unreliability
(D) Information overload and memory-capacity constraint

2. At the system-unit level, factor(s) that affect the performance of a Central Processor Unit (CPU) would comprise which one of the following:

(A) The number of transistors
(B) The width of the data bus
(C) The system clock speed
(D) All of the above

3. At the display level, the performance of a monitor is affected by which one of the following factors:

(A) Screen size
(B) Screen resolution
(C) Screen brightness
(D) Screen weight

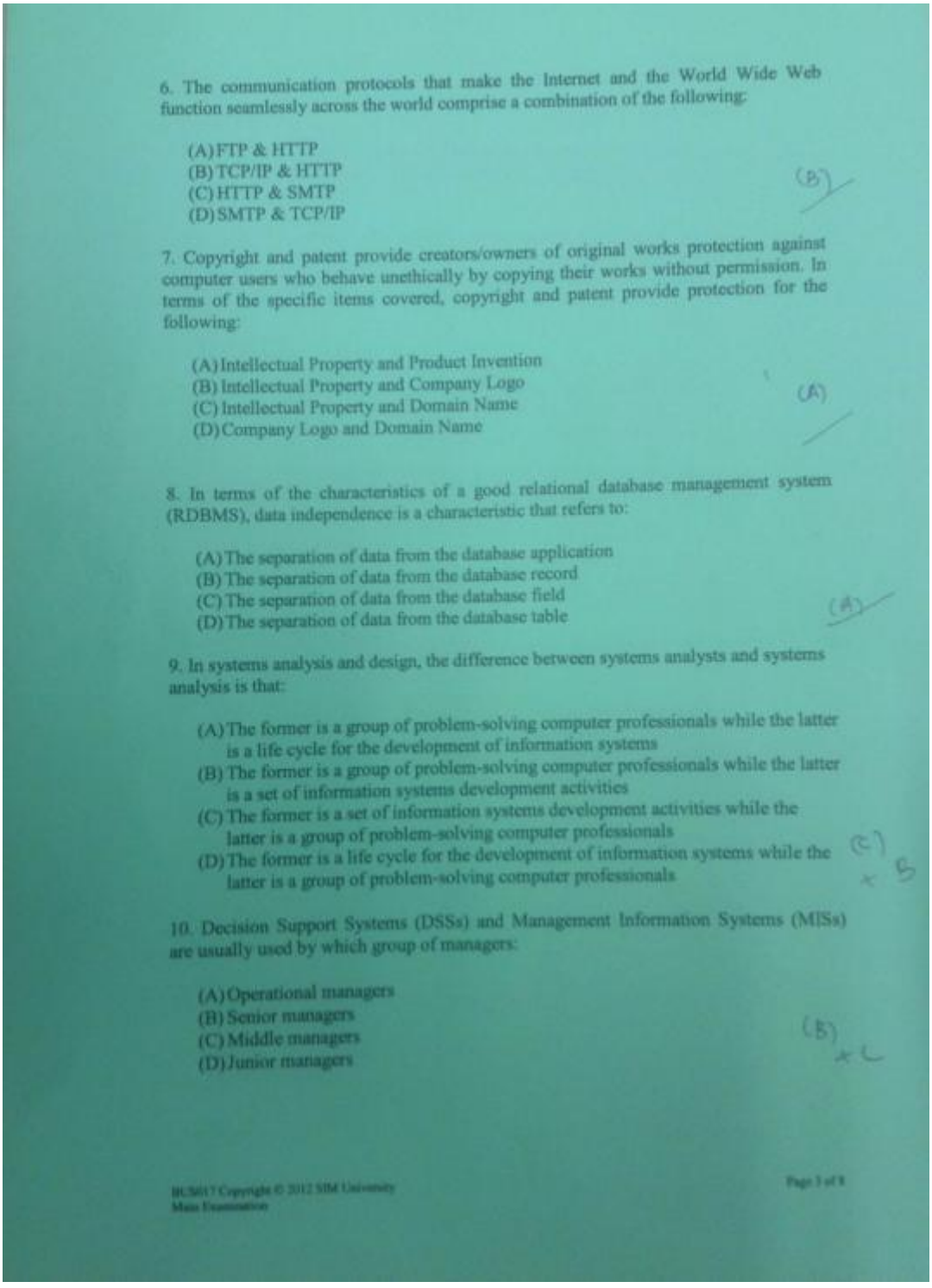
4. One of the functions of an operating system is to provide a user interface. Which kind of user interface would you expect to see from a modern operating system?

(A) Multimedia User Interface
(B) Coloured User Interface
(C) Graphical User Interface
(D) 3-D User Interface

5. In wireless networking, which kind of data-transmission technology is suitable for long-range communication?

(A) Bluetooth
(B) Microwaves
(C) Fibre-optics
(D) Infrared

APPENDIX AI – Pretest Question Paper for January 2013 (Part 2 of 2)



6. The communication protocols that make the Internet and the World Wide Web function seamlessly across the world comprise a combination of the following:

(A) FTP & HTTP
(B) TCP/IP & HTTP
(C) HTTP & SMTP
(D) SMTP & TCP/IP

(B)

7. Copyright and patent provide creators/owners of original works protection against computer users who behave unethically by copying their works without permission. In terms of the specific items covered, copyright and patent provide protection for the following:

(A) Intellectual Property and Product Invention
(B) Intellectual Property and Company Logo
(C) Intellectual Property and Domain Name
(D) Company Logo and Domain Name

(A)

8. In terms of the characteristics of a good relational database management system (RDBMS), data independence is a characteristic that refers to:

(A) The separation of data from the database application
(B) The separation of data from the database record
(C) The separation of data from the database field
(D) The separation of data from the database table

(A)

9. In systems analysis and design, the difference between systems analysts and systems analysis is that:

(A) The former is a group of problem-solving computer professionals while the latter is a life cycle for the development of information systems
(B) The former is a group of problem-solving computer professionals while the latter is a set of information systems development activities
(C) The former is a set of information systems development activities while the latter is a group of problem-solving computer professionals
(D) The former is a life cycle for the development of information systems while the latter is a group of problem-solving computer professionals

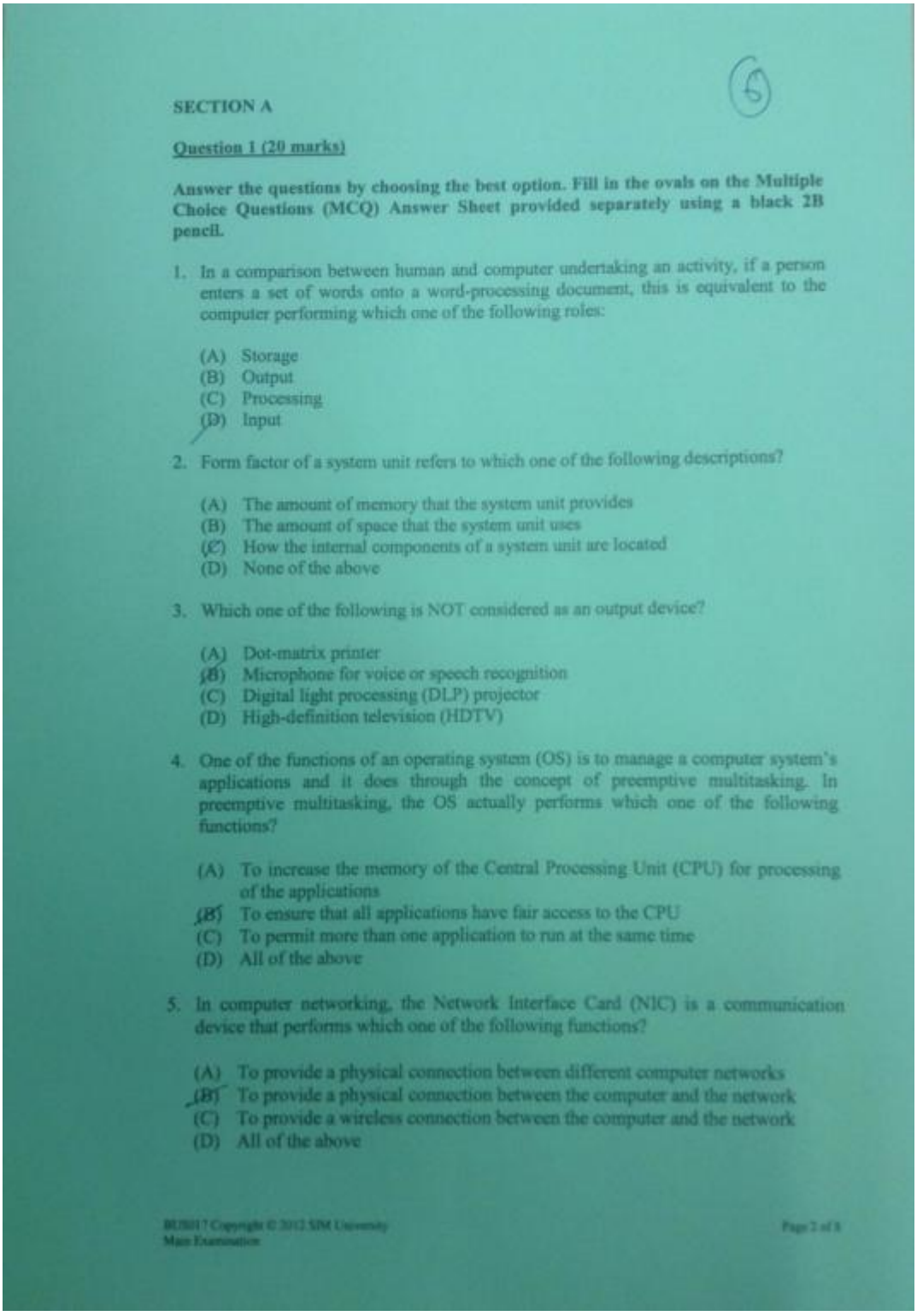
(C) x B

10. Decision Support Systems (DSSs) and Management Information Systems (MISs) are usually used by which group of managers:

(A) Operational managers
(B) Senior managers
(C) Middle managers
(D) Junior managers

(B) x C

APPENDIX AJ – Pretest Question Paper for April 2013 (Part 1 of 2)



SECTION A

Question 1 (20 marks)

Answer the questions by choosing the best option. Fill in the ovals on the Multiple Choice Questions (MCQ) Answer Sheet provided separately using a black 2B pencil.

1. In a comparison between human and computer undertaking an activity, if a person enters a set of words onto a word-processing document, this is equivalent to the computer performing which one of the following roles:

   (A) Storage
   (B) Output
   (C) Processing
   (D) Input

2. Form factor of a system unit refers to which one of the following descriptions?

   (A) The amount of memory that the system unit provides
   (B) The amount of space that the system unit uses
   (C) How the internal components of a system unit are located
   (D) None of the above

3. Which one of the following is NOT considered as an output device?

   (A) Dot-matrix printer
   (B) Microphone for voice or speech recognition
   (C) Digital light processing (DLP) projector
   (D) High-definition television (HDTV)

4. One of the functions of an operating system (OS) is to manage a computer system's applications and it does through the concept of preemptive multitasking. In preemptive multitasking, the OS actually performs which one of the following functions?

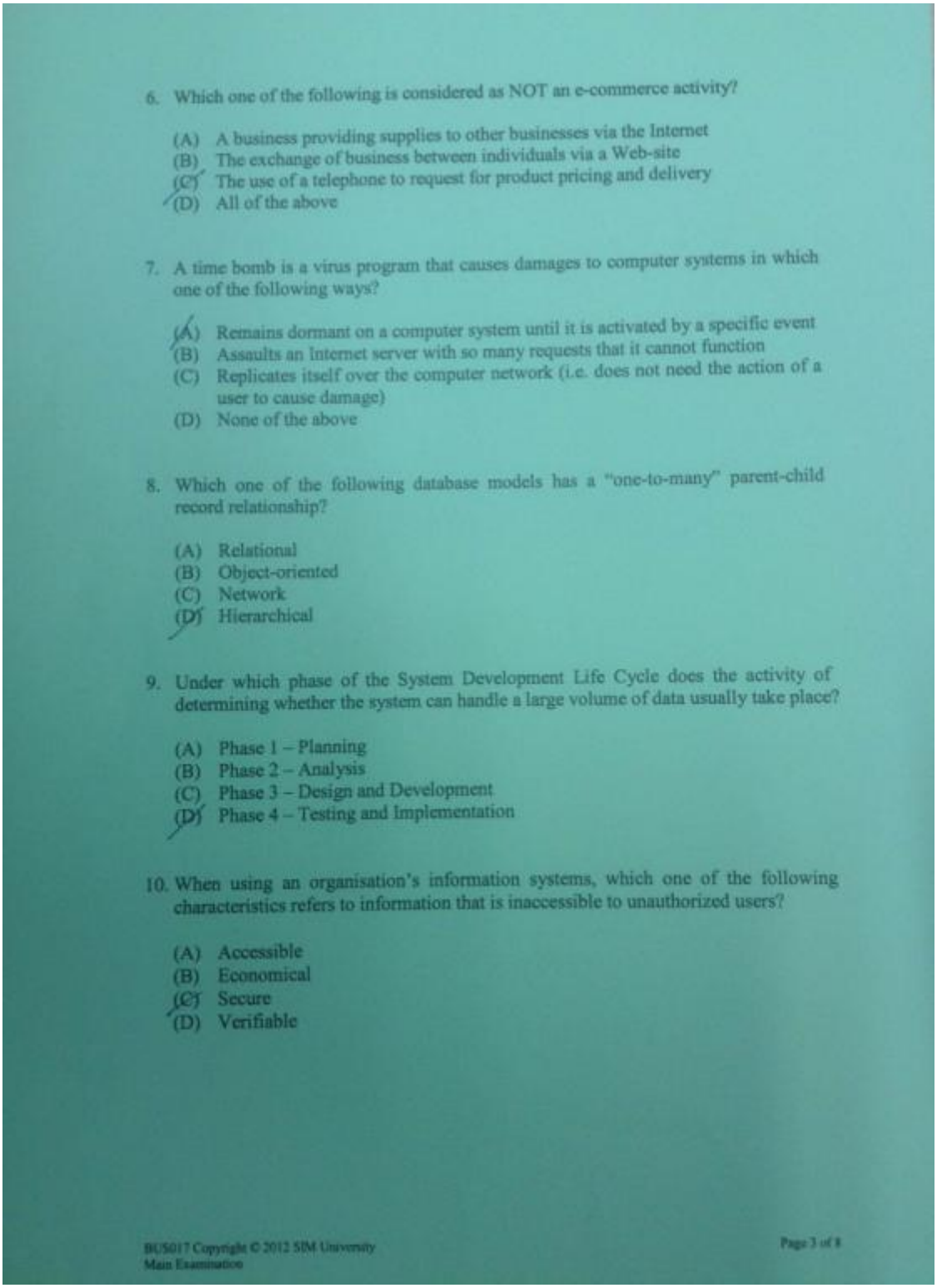
   (A) To increase the memory of the Central Processing Unit (CPU) for processing of the applications
   (B) To ensure that all applications have fair access to the CPU
   (C) To permit more than one application to run at the same time
   (D) All of the above

5. In computer networking, the Network Interface Card (NIC) is a communication device that performs which one of the following functions?

   (A) To provide a physical connection between different computer networks
   (B) To provide a physical connection between the computer and the network
   (C) To provide a wireless connection between the computer and the network
   (D) All of the above

Main Examination

APPENDIX AK – Pretest Question Paper for April 2013 (Part 2 of 2)



6. Which one of the following is considered as NOT an e-commerce activity?

(A) A business providing supplies to other businesses via the Internet
(B) The exchange of business between individuals via a Web-site
(C) The use of a telephone to request for product pricing and delivery
(D) All of the above

7. A time bomb is a virus program that causes damages to computer systems in which one of the following ways?

(A) Remains dormant on a computer system until it is activated by a specific event
(B) Assaults an Internet server with so many requests that it cannot function
(C) Replicates itself over the computer network (i.e. does not need the action of a user to cause damage)
(D) None of the above

8. Which one of the following database models has a "one-to-many" parent-child record relationship?

(A) Relational
(B) Object-oriented
(C) Network
(D) Hierarchical

9. Under which phase of the System Development Life Cycle does the activity of determining whether the system can handle a large volume of data usually take place?

(A) Phase 1 – Planning
(B) Phase 2 – Analysis
(C) Phase 3 – Design and Development
(D) Phase 4 – Testing and Implementation

10. When using an organisation's information systems, which one of the following characteristics refers to information that is inaccessible to unauthorized users?

(A) Accessible
(B) Economical
(C) Secure
(D) Verifiable

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Main Examination

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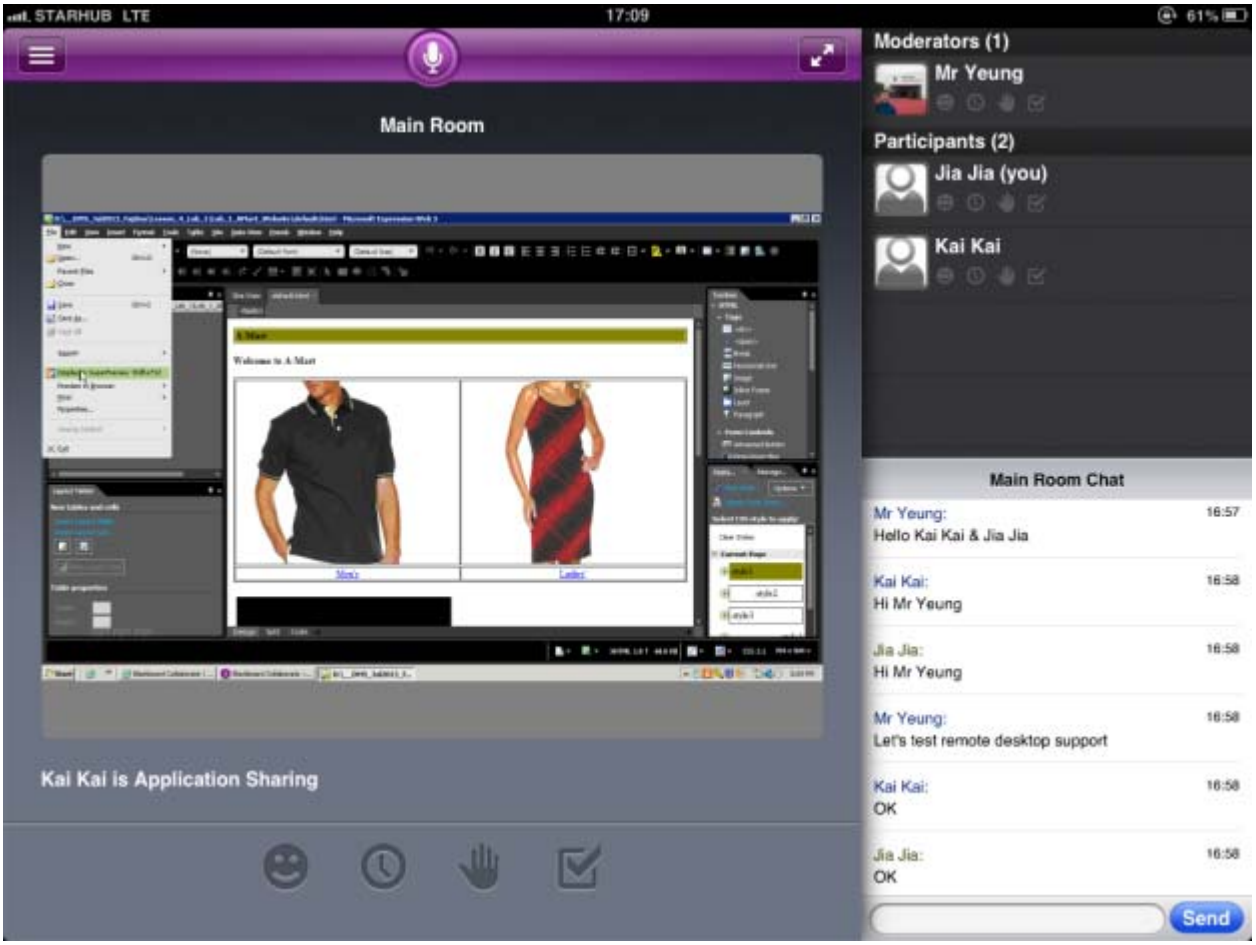
APPENDIX AL – Mobile Web Conferencing



APPENDIX AM - Author Biography

Mr. Sze Kiu Yeung is a Senior Lecturer who teaches information systems at SIM University's School of Business in Singapore. Currently, he is also a doctoral student in the EdD in Distance Education (Cohort 2) program with Athabasca University, Canada. This research topic on *Synchronous Web Conferencing: Towards a pedagogical model for effective learning* is driven by Sze Kiu's fascination with synchronous technology. Through this study, he aims to uncover new pedagogical ideas that would make teaching and learning a rich and rewarding experience for both learners and instructors in a synchronous online environment.

As part of his learning journey in engaging with the wider academic community, Sze Kiu has, at different stages of his research development, submitted abstracts and/or full papers to and accepted by the following international conferences for presentation:

1) Blackboard Forum on Teaching & Learning 2011, Hong Kong Polytechnic University, Hong Kong, 20 October 2011

2) Business and Information Conference 2012 (BAI2012), Sapporo, Japan, 3-5 July 2012

3) Graduate Student Conference 2012 (FGS2012), Athabasca University, Edmonton, Canada, 14-16 September 2012 (Virtual Presentation)

4) Faculty Research Seminar, School of Business, SIM University, Singapore, 26 February 2013

5) e-Learning Forum Asia 2013 (eLFAsia2013), Baptist University, Hong Kong, 29-31 May 2013

6) International Conference on Economics, Education, Psychology and Society (ICEEPS2013), Beijing, China, 13-15 June 2013

7) Graduate Student Conference 2013 (FGS2013), Athabasca University, Edmonton, Canada, 13-15 September 2013 (Virtual Presentation)

8) 3-Minute Thesis Presentation, EDDE806 Seminar, Athabasca University, Athabasca, Canada, 25 September 2013 (Virtual Presentation).

9) International Council for Educational Media Conference 2013 (ICEM 2013), Nanyang Technological University, Singapore, 1-4 October 2013.