

Using Interactive Video Conferencing for Teaching a Doctoral Programme at Open University Malaysia

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Introduction

Video conferencing was first developed in the sixties by the American firm AT&T, as a videophone. However, over the years, innovations in combined internet and multimedia technologies has revolutionised videoconferencing technology making it one of the newer learning technologies used in delivering education and training today. Video conferencing may be defined as real time, interactive communication between individuals, or between individual(s) and groups and between groups, across long distances with video and audio contact. The communication may include data and graphics exchange. Videoconferencing offers new dimensions in learning support by facilitating interaction and dialogue between physically remote groups of learners and facilitators. Videoconferencing lets students and facilitators who are physically remote share learning experiences by seeing and hearing each other. Video conferencing communication held just between two locations is referred to or known as point-to-point videoconferencing. Communication between one and many sites is known as multipoint videoconferencing and is made possible by a computerised switching system called the video bridge. This system allows for the switching of communication and interaction between different locations.

The paper will describe a pilot-project conducted over a period of two semesters using videoconferencing in delivering courses for the Doctor of Philosophy in Education (PhD) programme at the Open University Malaysia. Focus will be on the pedagogical aspects of using videoconferencing, student and instructor evaluation of the delivery format. The first author of the paper is the instructor for the courses presented while the second author provided the technical expertise for conduct of the video conferencing sessions.

Background

Open University Malaysia's main campus is located in Kuala Lumpur and distributed across the country are 36 Learning Centres. In January, 2006, the School of Graduate Studies, offered the Doctor of Philosophy programme in Education. The structure of the programme consists of 20 credit hours of coursework and a thesis. The coursework consists of three taught courses and three doctoral seminars. In the January semester, two courses – *Educational Research Methodology* and *Psychology of Learning and Instruction* were offered while in the May semester, a course – *Advanced Research Methods in Education* and a doctoral seminar – *Research in Education* was offered. The first batch of 21 students who registered for the programme came from across the states of Malaysia and in the second semester, only 18 students continued. For each of the three courses they had registered for, students were required to attend 15 hours of face-to-face sessions divided into three seminars.

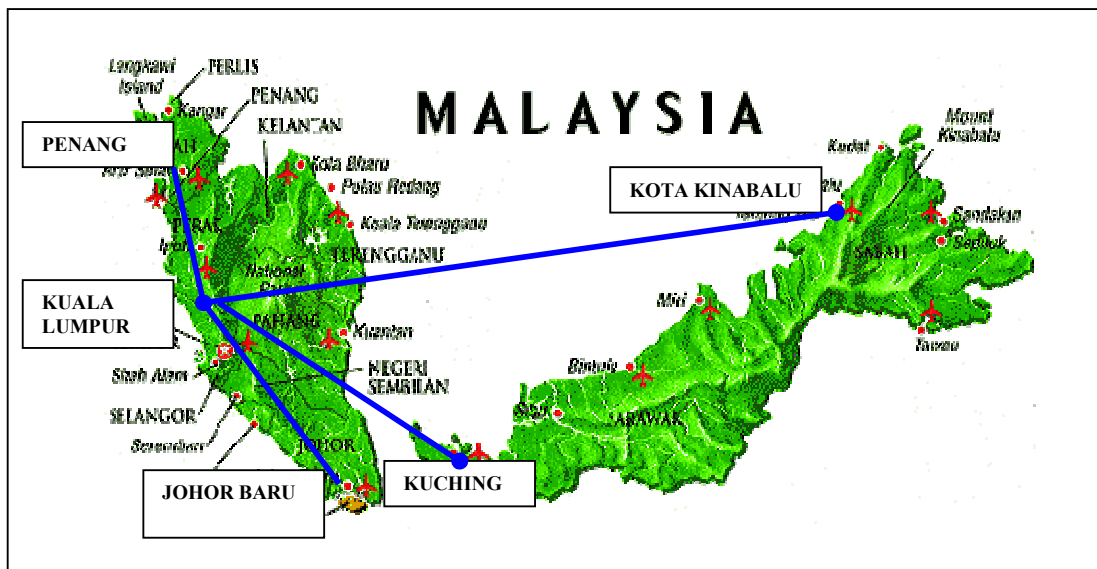


Figure 1: Map of Malaysia Showing Video Conferencing Sites

The unique properties of the internet offered a solution to the problem and it was decided that video conferencing be used for the delivery of courses for the doctoral programme to fulfil the requirements of face-to-face interaction. The decision to use videoconferencing was motivated by geographical, pedagogical technological and financial considerations:

- First, students were thinly distributed across the country and the problem was how to fulfilment the requirements of face-to-face sessions (see Figure 1). Video conferencing was found appropriate to overcome the lack of expertise and paucity of academics with postgraduate qualifications in education outside Kuala Lumpur and the state capitals where most universities and teacher training colleges are located. Academics in specialised fields of education was even less.
- Second, advancements in video conference technology has reached the level of sophistication that permits the transmission of quality visual images using ordinary broadband internet technology. In other words, it was not essential to have a dedicated line to enable video conferencing. The portability of equipment and its plug-and-play features was an important consideration as it would enable its implementation in remote areas where technical expertise is a scarcity.
- Third, the use of video conferencing as a mode of delivery for the PhD programme was also prompted by the recent expansion of broadband networking facilities throughout the country. Currently, broadband penetration is about 7% and rapidly expanding. Rapidly expanding broadband penetration is significant if students in remote areas are to be reached through video conferencing.
- Fourth, the cost of video conferencing technology which was prohibitive earlier is more readily available to many educational institutions because of the reduced prices. With more players in the market, the cost of equipment has been much lower which is an important consideration if video conferencing facilities are to be expanded to other parts of the country.

Research on Video Conferencing Used for Teaching and Learning

As the use of video conferencing in teaching and learning has expanded, educators and researchers have increasingly sought answers to such questions as whether interactive videoconferencing is as effective as the traditional classroom and how video conferencing can enhance student interaction and collaboration. Greenberg (2004) summarising the research on video conferencing concluded that in the delivery of instruction, videoconferencing is neither more or less effective than the “traditional classroom”. However, compared to other technologies, video conferencing allows for greater interactivity and when used appropriately, video conferencing can be a cost-effective way for educational institutions in delivering educational experiences to an expanded student population. Based on their review of relevant studies, Summer and Hostetler (2002), found that video conferencing and traditional face-to-face encounters did not reveal any advantage one over the other. Interestingly, they observed that collaborating over distance requires time to exchange messages, and this makes it difficult to clarify ideas and thus increases decision-making time.

In an analysis of various experimental studies, Cavanaugh (2001) found a slight positive effect in favour of technology-based instruction compared to face-to-face instruction. However, she suggested that the use of technology be expanded to exploit its educational opportunities. Amirian (2002) in a review of studies on video conferencing, asserted that interaction is critical in video conferencing to support social learning in which learners negotiate meaning through interaction with peers over distance leading to the formation of a community of learners using technology. The importance of interactivity is also supported by Twigg (2001), who suggested that the way forward is to create an environment in which students interact and wrestle with learning materials directly (or in teams), under the tutorial guidance of a mentor.

Similarly, Heath and Holznagel (2002), in their review pointed out the unique ability of video conferencing in promoting interaction in the classroom between students, experts and the tutor. They found that students were encouraged to collaborate when working on authentic tasks, interact synchronously to gain understanding and interpretation. Based on student evaluations, Kunz (2002), recommended that the didactic delivery of a course must give way to more active involvement of participants, and the instructor must be willing to adapt his or her teaching style to the integration of the new media. Interestingly, Bradey (2003), found that students’ evaluation of video conferencing at the University of Stirling tended to focus on “the skills of the presenter or speaker, rather than the logistics of the video conference itself” (p.2).

Besides interactivity, many of these studies also emphasised the issue of accessibility. For example, Kriger (2001) stated that institutions are using video conferencing to supplement on-site teaching reaching out to students who would not normally have access to higher education. Video conferencing has also been used by universities to establish partnerships with industry in the provision of training programmes. Similarly, Twigg (2001) in her analysis of various studies stressed the potential of video conferencing reaching out to a broader student population. For example, distance learners are able to see laboratory demonstrations as well objects and equipment.

Greenberg (2001) concludes most appropriately in saying that “when it comes to videoconferencing-based education, a few things are known for sure: that interactivity is king, that this technology is vital for expanding student access to a

wealth of instruction, and that videoconferencing can be seen as a remarkably useful tool when combined with robust, well-planned, student-centred instruction” (p. 22).

Implementation

As a pilot-project, it was decided that initially classes be conducted at five locations – Kuala Lumpur, Kuching, Kota Kinabalu, Johor Baru, and Penang (see Figure 1). A total of three 5 hour sessions was planned and held during the weekends. Eleven students met at the Kuala Lumpur centre, three students met at the Kuching centre, two met students at the Penang centre, one met student at the Kota Kinabalu centre and one student at the Johor Baru centre. The instructor was stationed at the Kuala Lumpur centre together with the eleven students (see Figure 3).

In Kuala Lumpur, equipment was installed at OUM headquarters and a seminar room was converted into a video conferencing studio. Similarly, a room was converted for installation of relevant equipment at the other four sites. Initial testing of the equipment was conducted involving OUM’s technical staff and the vendor to test bandwidth capabilities, responsiveness of equipment and clarity of visuals and sound. During the initial testing, there was a problem with configuration of the router at the Kota Kinabalu centre which was later resolved. Later, staff in each of the remote sites were trained on the use of the equipment, especially in how to make connection when there was a break in transmission. The instructor was trained in using the remote control and how to switch from different modes such as camera, notebook, visualiser and zooming in and out.

a) Technical considerations

The equipment set up in each of the sites were housed in a room which could accommodate approximately 10-12 students. The equipment enabled transmission over both ISDN and over broadband connection supporting multi-point conferences. The equipment consisted of the following:

- Auto-focussing zoom camera
- Large display screens
- LCD projectors
- Table, lapel and roving microphones
- Document camera suitable for small object, documents, books
- DVD player and recorder for recording sessions
- Notebook computer connected to show powerpoint presentations

The instructor was located at the OUM main campus in Kuala Lumpur with 11 students and other students distributed across the four learning centres or sites throughout Malaysia. The Multipoint Control Unit (MCU) was located at the OUM headquarters. Connections were initiated by the remote sites dialling up the MCU and establishing a connection. The conferencing system was internet protocol-based, conforming to the H. 323 standard. This conformity enabled seamless conferencing among devices from different manufacturers. Most modern devices can optimise bandwidth usage. From the many sessions conducted it was found that a minimum of 128 kilobits per second (kbps) of bandwidth for each remote unit was required to ensure good video and audio quality. The video quality degrades with reduction in bandwidth but priority is always given to audio under conditions of low bandwidth. For example, the bandwidth available at the MCU must be at least n multiplied by the minimum bandwidth available for each session at the individual learning centres. Thus, to carry out 8 simultaneous conferencing with 128 kbps of bandwidth allocated

at each site, a minimum of 1 Megabit per second of bandwidth has to be made available at the MCU.

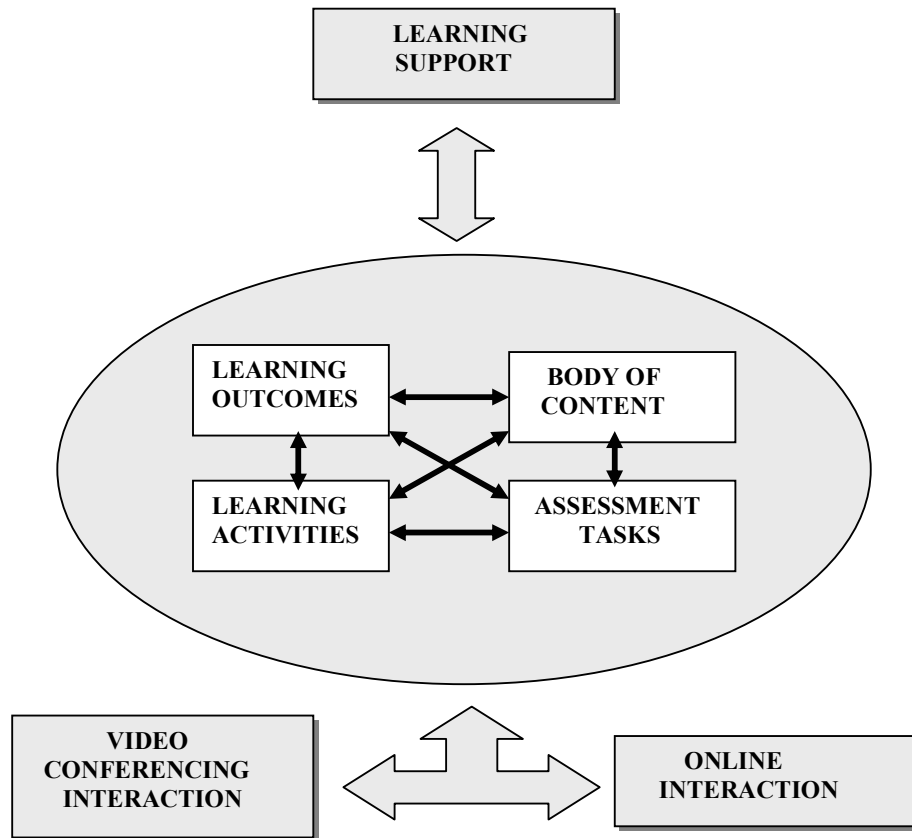


Figure 2: The Blended Learning Approach Adapted for the Doctoral Programme

[source: J. Phillips, A. Ahmed & K. Kaur. Instructional design principles in the development of an e-learning graduate course. International Conference on E-Learning: Knowledge Based Society. Bangkok. 4-7. August, 2005]

It was also found that when many sites confer simultaneously, normal display screens such as computer monitors or plasma screens may be too small for good viewing. A large display is also essential when handwritten text or small fonts are communicated. At the OUM site an LCD projector and a large screen was used to display all the students from the remote sites. There was also a conflict in lighting requirements where bright lighting was needed for the video conferencing camera to ensure clear images and subdued lighting was required near the screen for clarity of projected images. This was resolved by using a high lumens projector (a minimum of 2000 ANSI lumens) capable of good display under full room lighting. It was also realised that good audio quality had to be maintained because many video conferencing sessions have failed because of poor audio quality. Good audio quality had to be ensured, especially at the remote sites. Inadequate speaker systems did result in loss of clarity and listener fatigue and long sessions tended to be insufferable.

Hence, a high powered-speaker system was installed with a small sub-woofer to boost audio clarity at the OUM site and to be followed at the other sites.

b) Pedagogical Strategy

The pedagogical strategy adopted for the delivery of the doctoral programme was based on the blended learning approach practiced by Open University Malaysia which provides a structure for the learning process while nurturing student participation, expression and reflection. Emphasis was on interactivity, authentic problem solving activities, multiple perspectives and representations (Phillips, Ahmed & Kaur, 2005). For each course, students were provided with a Learning Package consisting of a course guide, an assignment guide and course content divided into 10 chapters totalling about 220 pages presented in a personalised manner with learning activities interspersed at strategic points in the text. The whole teaching-learning sequence was initiated through the Learning Package in which learning outcomes, content, learning activities and assessment tasks were aligned appropriately (see Figure 2).

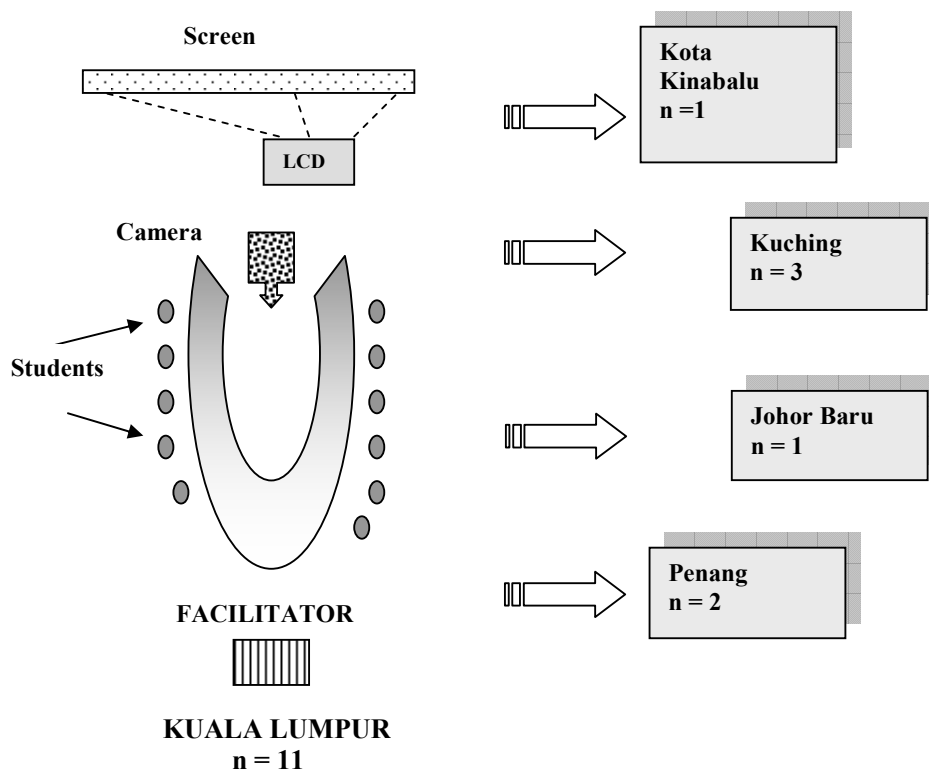


Figure 3: Classroom Arrangement for Video Conferencing

Students participated in an online forum through a learning management system specifically designed for OUM called MyLMS and topics for discussion and deliberation were extracted from the learning package. In addition, students were provided with other support such as access to the digital library and selected articles from the web. Face-to-face sessions was substituted with video conferencing interaction. At the Kuala Lumpur centre a U-shaped seating layout was found appropriate with the facilitator seated at the bottom of the U facing the camera (see Figure 3). This was to enable the camera to capture any one of the eleven students

when they talked. In the Kuching, Kota Kinabalu, Johor Baru and Penang sites students sat in a row facing the camera as they were less in numbers.

In each session, the instructor began with a short presentation of the main points followed by discussion. The questions students raised were usually related to aspects of the learning material that needed clarification, elaboration and illustration. At various points during the lesson the facilitator directed students to the learning activities in the learning package and their opinions were sought on various issues. On certain occasions, case studies were presented and students discussed the issues raised based on the principles derived from the learning package. For the course on *Advanced Research Methods*, the instructor used the visualiser to write down formulas and worked out statistical problems. At various points in the sessions, the notebook was connected to demonstrate the use of the Statistical Package of the Social Sciences (SPSS) for analysis of data. The students saw the sequences of analysis on the screen and simultaneously hearing the instructor explaining. The sessions were also used for presentations by students and it proved to be most successful as others were able to make comments and suggestions. During the duration of the two semesters, students were exposed to a total of 45 hours of video conferencing sessions and the following are the comments of both the instructor and students:

Instructor Reflections

- It was an exciting experience for me as it was the first time I had been involved in video conferencing. I could never imagine that what I was doing was very similar to TV stations presenting the news or covering sporting events. It was like having the students in Kota Kinabalu, Kuching, Penang and Johor Baru in the same room.
- In fact, that was how most students felt and during the break students talked informally as though they were in the same room. Initially we were bothered by the slight lag, but soon got used to it.
- It was quite a challenge having to juggle 11 ‘live’ students and 7 ‘virtual’ students at the same time. It would have been much easier for me to be alone in the Kuala Lumpur centre addressing students in the remote sites. Without having ‘live’ students, I would be able to be more focussed and would not have to divide my attention. Here I had to address queries from ‘live’ students as well as ‘virtual’ students. In many instances, the microphone was not able to pick up the voice of ‘live’ students.
- I used the document visualiser to jot down notes and draw diagrams as though I was writing on the chalkboard. Students found the writing to be clear and helped in the illustration of points raised.
- The document visualiser was used on occasions to show objects. Some may ask what objects do you need to show in education courses. Well, when illustrating the concept of ‘constructivism’ I showed students the statues of three Chinese sages to illustrate ‘the construction of knowledge’ by different interpretations of the same object.
- Initially I did not connect the notebook computer as because I did not want to be bothered with too much gadgetry for a start. However, for the course involving statistics, I had to show the use of a statistical package in data analysis.
- It was interesting to note, that in the initial stages of the sessions, I tended to raise my voice. This was due to the perception that the remote students were

far away and I had to raise my voice to be audible. Later, I realised it was not necessary and adopted a regular tone of voice as if they were in the same room.

- I realised that proper lighting and appropriate room colour was necessary to enhance the quality of pictures transmitted. Also, it was realised that the display screen had to be located at eye level so as to avoid students looking up or looking down. This was observed with the Kuching centre.
- All the sessions were recorded, edited and made available to students in the form of CDs. Excerpts of the sessions will be converted into video clips and uploaded on to the Learning Management System.
- The need to maintain audience attention was crucial and I detected tell-tale danger signs such bored-looking students, eyes closed and confusion especially in the statistics class.
- So I posed questions, invited comments and their opinions so as to make the sessions two-way as there is a strong tendency to lecture.
- Providing students with printed material ahead of the teaching-learning sessions proved to be effective and student could make notes and prepare questions to be asked.

Student Evaluation

Students evaluations were obtained by asking them about their experience with the video conferencing sessions. Overall student evaluation was positive and the following are some comments:

- “I like the idea of video conferencing as it saves me a lot to time and money travelling”
- “Without video conferencing, I may have to pursue the course interacting with other students and the instructor only through the online forum and e-mail.
- “It would be lonely doing the courses without video conferencing”
- “It would be impossible for me to fly to Kuala Lumpur from Kota Kinabalu to attend the face-to-face sessions”.
- “I wish the breakdown in transmission in Kota Kinabalu could be reduced”
- “Even though the sessions are long, I enjoyed them as it beats having to travel down to Kuala Lumpur from Penang”.
- “Sometimes I am unable to hear what the students are Kuala Lumpur are saying; and it is very tiring”.
- “The lag time can be annoying”.
- “If not for video conferencing we would not be able to make presentations of our work”.
- “Video conferencing should be used for other things, such as talks and even group discussion”

Conclusion

The pilot-test revealed that reactions from students has been positive. Students commented that though the sessions were rather long, they enjoyed them and got used to the new environment. Some were rather disappointed that they will not be meeting their coursemates again as the coursework requirements have been completed and they are on their own. Video conferencing has endless possibilities. What was once perceived as a complex and complicated technology has become extremely user friendly. With the expansion of broadband technology and more reasonable pricing of

the hardware, it is envisaged that more learning centres in OUM will be equipped with such facilities. The technology opens up opportunities for students from remote to pursue graduates courses. With a short period of training, anyone can explore the potential the technology for their respective courses. Besides, using video conferencing for teaching and learning, the technology will be adopted for students making presentations of their research proposals, supervisors advising students on their thesis or dissertation in localities where there are no available local expertise, students defending their thesis in a viva voce and academic talks by prominent speakers broadcasted to a larger audience.

The pilot-test also revealed that just like all teaching-learning situations, the instructor or facilitator plays an important role in the video conferencing setting. He or she has to be well-prepared and knowledgeable about the subject area. Most important, the person must be a good teacher, a good presenter, a good facilitator, a good communicator with a sense of humour and able to hold the attention of students. Hence, despite using such advanced technology in teaching and learning, the pedagogical skills of the teacher is still of utmost importance.

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