MOVING FROM LOCAL TO GLOBAL TEACHING: INTEGRATING APPROPRIATE TECHNOLOGIES – A REFLECTION

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ABSTRACT

There are many reasons why universities and other tertiary education institutes are moving away from providing local (or face-to-face) teaching to global teaching. Our School of Computer and Information Science is one that has increasing number of students who are studying our programs overseas. The face-to-face mode of learning is effective as it provides instant feedback and cross-communications between lecturer and students and among students themselves. Moving from face-to-face learning to global learning can impair the effectiveness of teaching and learning unless technologies and strategies that can provide rapid feedback and communication are maintained. In this paper we share our experiences in the educational use of communication technologies to provide alternative communication channels for our global students. We examine the use of existing off-the-shelf software and software being developed in our School and different approaches to encourage active rather than passive participation by students in a situation where cultural and language issues are significant. We also investigate the impact of these technologies and approaches on our students. Finally, we discuss our efforts to provide an online environment that goes some of the way in meeting the requirements of academics, administrators and students.

INTRODUCTION

"The 'best' - or most desirable – education is still based on the Oxbridge system of personal tutors and intense immersion in an intellectually transforming context." (Brabazon, 2002) It represents the type of academic establishment to which most students can neither afford nor gain entry. Although the Oxbridge system may appear to be inconsistent with the realities of global teaching it is possible to retain some of the educational experience whilst partly removing the students from the campus.

Global teaching is a model of how universities can offer degree programs to students located at sites anywhere in the world. It strives to harness technology to enable us to offer quality education at a reasonable cost. This paper will focus on the experiences of academic staff from the University of South Australia in implementing global teaching to Hong Kong students enrolled in undergraduate degree programs.

Global teaching obviously requires considerable technical and human resources, commitment from staff and effective administration and, to be successful, it also requires close attention to language and cultural issues. Geographic and political issues also play a very significant role in global teaching. Australian universities such as the University of South Australia have successfully implemented global teaching in South-East Asia.

The provision of tertiary education has become a very important source of export earnings for Australia rivaling wheat and other major exports. Indeed the potential rewards for finding and supporting an effective model for global teaching are perhaps best illustrated by the following comment.

"In 2001, OECD estimated that there were 30 million students world-wide with secondary school records that would qualify them for university entrance, with an English language ability equivalent to an IELTS score of 6.5 and with the means to pay for a university education who nevertheless could not gain entry to university education. In 2006 OECD estimates that this figure will rise to 100 million." (OECD representative 2002)

In this paper we describe the integration of online technologies and traditional teaching methodologies in a successful undergraduate program. The methodology we will outline has been applied consistently to an entire degree program consisting of many courses (subjects) and covering a number of different disciplines over a number of semesters. Details are also given of the evaluation study that we conducted on student usage and opinions on the online facilities we provided.

Different Teaching Media
"There are many different media each with its benefits and limitations. Each medium should be used for what it does best. Student learning outcomes and satisfaction with the course, as a whole will probably improve". (Lowe 2002) We will examine global teaching in the context of the following media:
- Local teaching is the traditional face-to-face (f2f) teaching. It may involve large numbers of on-campus international students but it treats them in the same way as local students.
- Distance teaching relies on students who are unable or unwilling to attend classes, studying from materials sent to them. Traditionally any communication between students and lecturer is by post and telephone or email.
- Online teaching is based on the internet and computer-based tools. Face-to-face interaction is non-existent. In online teaching, the internet attempts to stand alone as a single media of delivery.

Our model of global teaching uses a mix of delivery modes that enable programs to be delivered to students located at specific sites that can, at least in theory, be anywhere in the world. The mixture of face-to-face and online teaching also addresses the challenge of how to develop a sense of community among participants. (Haythornthwaite 2000, Motteram 2001)

Modes of Operation in Local Teaching
We define local teaching as the traditional face-to-face (f2f) teaching. It can be divided into four modes based upon the interactivity, information throughput and aim of the presentation. These modes are the lecture mode, tutorial mode, informal mode and offline mode. Each one of these modes has different characteristics that can be expressed in terms of the following parameters.
- Bandwidth – the amount of information transferred from the teacher to the student.
- Interaction – the extent to which the student is expected to interact with the teacher.
- Targeting - the proportion of information presented at a level that meets the requirements of a student.
The benefits and weaknesses of any single mode become apparent when viewed against these parameters. These parameters also give us a means of determining at least roughly a suitable combination of different modes which summarizes local teaching – see Table 1.

The Oxbridge system, for example, can be characterized as high bandwidth, high interaction and high targeting. Global teaching aspires to matching these important characteristics.

Lecture Mode
A lecturer presents course material to student in a face-to-face environment. Communication in this mode is usually one way with students not expected to ask questions or interact with the presenter. The size of a class often will preclude any possibility of effective interaction. Consequently this mode can be characterized as high bandwidth, low interaction and minimal targeting.

Tutorial Mode
This mode includes both the traditional classroom tutorial and practical sessions. In both cases, classes are small and interaction is expected. Students come to workshops pre-prepared and therefore this mode is used students to reinforce their ability to apply their knowledge. The primary purpose of workshops is not to transfer information. Students are able to ask questions and receive instant feedback. Collaborative learning is supported to a limited extent. This mode can be characterized as low bandwidth, medium interaction and medium targeting.

Informal Mode
The informal mode of communication is realized either during consulting sessions organized by the lecturer or, alternatively, during ad hoc sessions, before or after lecture or tutorial classes. Students approach the lecturer with questions regarding either subject work or administration. To many students these informal modes are extremely important and effective. This mode can be characterized as low bandwidth, high interaction and high targeting.

Offline Mode (Electronic)
The offline mode includes deliberate, student-initiated forms of communication that is not face-to-face. Traditionally it was mainly telephone communication but increasingly it is done via email. Students find email very easy to initiate and consequently this form of communication is becoming a major issue. Strategies for preventing or dealing with heavy email traffic are available and will be discussed in our paper. The Offline Mode can be characterized as low bandwidth, medium interaction and high targeting.

Table 1

Mode	Bandwidth	Interaction	Targeting
Lectures	High	Low	Low
Tutorials	Low	High	Medium
Informal	Low	High	High
Offline	Low-medium	Medium	High

Modes of Operation in Distance Teaching
Distance teaching is based upon the idea that all materials are posted to the student who works independently through the lecture notes, exercises and assignments. Some communication with a lecturer (or tutor) is possible. This model is severely limited when we compare it to local teaching. We have identified three modes of operation in distance teaching and these are summarized in Table 2.

Self-study Mode
In terms of lecture notes, students in principle receive the same material that is presented to students in local teaching. In reality this method of teaching has less bandwidth as it omits the lecturer's narrative to the material. In distance teaching students must also do the tutorials in the same mode. Low bandwidth, no interaction and no targeting characterize the self-study mode.

CDROM-based Mode
At the University of South Australia much of the early impetus for the adoption of a CDROM in teaching was to support our distance teaching especially in dealing with students who may have poor internet infrastructure. This allows us to produce large interactive teaching materials for students use. This interactive capability means that the CDROM-based mode has some targeting potential. Although the development cost for CDROMS are high, the delivery cost is generally lower than for online delivery. A well-designed CDROM can deliver high quality sound and video and a CDROM is a very useful medium in situations where students would otherwise need to download and use a very large software application. The usefulness of this mode was underlined to us during the recent SARS (Sudden Acute Respiratory Syndrome) epidemic when our university banned travel to Hong Kong and in Hong

Kong itself, universities were closed for several weeks. Entire workshop lectures were recorded onto CDs in Australia and distributed to students in Hong Kong.

Offline Mode
The offline mode available to students in distance teaching as shown in the table below is equivalent to that available to students in local teaching. However, in remote locations it is often a lower bandwidth version due to the costs of long distance telephone calls or internet services.

Table 2

Mode	Bandwidth	Interaction	Targeting
Self-study	Medium-High	None	None
CDROM-based	High	None	Medium
Offline	Low	Medium	High

The Global Teaching Model
In our global teaching, we have tried different ways to shape the communication environment between students themselves and between students and teachers. We have maintained the lecture and tutorial modes outlined previously. Our model of global teaching also places considerable emphasis on asynchronous communication (discussion room and email) and synchronous communication (ICQ chat, IRC chat and Netmeeting) – see Table 3.

Lecture Mode in Global Teaching
This very traditional mode of delivery was retained principally for very compelling quality of service considerations. The lecture mode can be very flexible as it can be tailored to needs of the students and it works to break down the culture barrier. In our Hong Kong program all students have full-time employment and therefore an obvious decision was to hold all lectures in the evenings. Typically, in one semester-length course the students attend 2 workshops held approximately 7 weeks apart. Each workshop consists of four 3-hour lectures held from 7 pm to 10 pm on consecutive nights. Lectures are delivered by academics from the School of Computer and Information Science who travel to Hong Kong to deliver these lectures.

Tutorial Mode in Global Teaching
The principal purpose of tutorials is to assist students to apply their knowledge and it is quite feasible to design computer-based learning material that serves the purpose as well as a tutor. In the Hong Kong program however there was another equally important benefit of the tutorial mode that addressed the language issue. The local tutor is able to explain difficult concept, clarify questions and clear up ambiguities in the native language. Tutors also provide us with valuable feedback on many aspects of a course. Surveys given to local students invariably indicate the value of tutorials to many students.

Informal Mode in Global Teaching – Synchronous Communication
In global teaching this mode will usually, for practical or economic reasons will be emulated using synchronous communication tools such as chat rooms.

ICQ Chat-Room
ICQ is widely used free software. ICQ has some nice features that support to build a learning environment. One of the features of ICQ is that it helps a student feel that he is participating in a study room while studying online. When a student logs on to ICQ, he can see which classmates and lecturers are online. This helps students feel that they are not studying alone. Whenever they have a problem, they can ask a classmate or the lecturer immediately. Another feature of ICQ is that it allows multiple participants to join a chat. Furthermore ICQ allows us to set up a special chat-room by using Activelist. Participants need to use password in order to access to this chat-room. By leaving the chat-room available all the time, this chat-room will look like a discussion room.However, using chat-room by Activelist will sacrifice the ability to display an individual participant's message box. We no longer use

ICQ in global teaching because ICQ no longer supports the use of Activelist. Using the experience that we have got from ICQ chat-room, we built our own chat room.

IRC chat

IRC chat employs IRC communication protocol to provide a text chat environment and file transfer. IRC protocol also allows distributed client-server service that improves the speed on information transfer. IRC allows both private and public messages to be sent to other participants. IRC can be integrated into information web-server or stand-alone programs. IRC provides automatic logging, authentication, user administration and use of nickname in the chat room. The benefit on using IRC chat is that it is platform independent. You can run it on UNIX, PC or Mackintosh. It proved suitable for our purpose.

Netmeeting

Netmeeting provides four kinds of communications using the H.323 and T.120 communication protocols. H.323 protocol allows a point-to-point audio and video communication. If a multi-point audio and/or video communication is required, then a communication server such as Microsoft Conference server 2000 will be required. T.120 protocol allows data conferencing (multi-point) communication including text chat (similar to IRC chat), whiteboard (graphical image sharing), remote control, desktop and application sharing and file transfer. In many programming or design courses, students need to install and use software and some will have difficulty installing the software at home. Helping these students via emails or text chat is difficult. With whiteboard facility such as the one provided by Netmeeting a student can make a screen-shot of their directory or error messages and put it up as graphic on the whiteboard. With the desktop and application sharing, we can see what is happening on the student's computer in a real time mode. With the remote control ability, we can even remotely control the student's computer and fix the problem directly. Besides using Netmeeting to help student to solve setup problem, we can also use the desktop and application sharing to broadcast a demonstration or even run an online lecture with the aid of voice and/or video.

Instead of using the text chat facility, we find that it is better to use the whiteboard for normal chatting. All messages on the whiteboard can be viewed by anyone included participants who enter the meeting at a later point. With normal text chat (including IRC chat), latecomers cannot see the messages before they use the text chat. Since it is a whiteboard, it displays both text and diagrams at the same time.

On integrating Netmeeting into teaching, we have identified the following problems:
- Students cannot use Netmeeting if they are behind a firewall, which would be virtually useless if it allowed someone to control the computer remotely.
- The quality of audio signal at an acceptable level for teaching and learning. If the participants use a headset with microphone but without noise suppression, an echo would be created. Moreover, the slow transmission rate will also render a continuous voice message discontinuous.
- To broadcast a lesson or demonstration with voice, it requires a conferencing server. We are currently exploring how to use public voice chat facilities along with Netmeeting.
- Sharing the desktop with others is slow if the participants are using 56K modem. Of course the situation would become better if both side are using broadband. However, this puts those students without a broadband connection at a disadvantage.
- Even though the whiteboard is a very nice tool for teaching and learning, information on the whiteboard can be removed or destroyed by anyone. Therefore, participants must be made aware of clearly stated rules designed to prevent this.

"Computer technologies operate at their best when handling concrete ideas. They are inappropriate to grasp the abstract, the philosophical and the qualitative." (Brabazon, 2002) A whiteboard allows the students and the lecturer to draw on one board and this has proved very useful in describing abstract concepts that may otherwise be very difficult to explain using text only.

Offline Mode in Global Teaching – Asynchronous Communication

In global teaching the offline model is handled via email or the discussion room. As the offline mode can become the most time-consuming and hence the most expensive mode students are strongly encouraged to post all but personal matters to the discussion room to be answered by either the lecturer or preferably, by other students. When a discussion room is used in this way, the targeting can still be high with good student-student and student-lecturer interaction. Furthermore we are continuously improving our own implementation of a discussion room so that it can be a useful collaborative learning environment for students.

Email

One technology we have tried to decrease our reliance on is email. Students tend to over-utilize email facilities becoming dependant on the communication medium rather than learning to answer problems themselves. Consequently with offshore students we have taken a number of steps to limit this medium. Firstly, all students must address their questions to the discussion room unless their question is of personal nature (such as marks queries, etc.). Secondly, to encourage the usage of the discussion groups we have made them anonymous. In the event of an email arriving containing questions relevant to the course material the reply reminds the student that his or her question should have been posted to the discussion room. The answer to the question is then posted to the discussion room. This strategy has had a remarkable effect on the volume of email decreasing the count from an average of 10-20 emails a week to approximately 20 per teaching semester.

Discussion Room

The core communications medium we use with students is the discussion room. This board is basically a public forum where students post questions regarding the content of the course. A discussion room can be configured such that students:

- are identified by name;
- are totally anonymous;
- hide their identity by using an alias of their own choosing.

The first version of this board allowed students to post messages only with their identity shown on the page. This led to a very poor usage rate that was presumably caused by students not wanting to appear inadequate to the other students. Version two of the board was completely anonymous and overall usage rates were extremely high. This version was always susceptible to being abused by students if left unmonitored by the academic in charge of the course. This board was used as a forum for derogatory complaints about not only the course and the lecturer but also the program in general. As a result of our experience with this, we developed version three of the discussion board that allowed students to post anonymously (with a nickname or alias) but tracked entries in a log file. This log file could be checked in the event of misuse of the board. In this way we were able to warn students that derogatory comments on the site would lead to banning of the student from the discussion groups. This has led to a further improvement in quality and furthermore, student participation rates have remained high due to the perceived anonymity of the site.

The discussion room is a very useful tool to achieve collaborative learning. Instead of using discussion room as a place for students to ask the lecturer questions, we encourage students to answer each other's questions and engage in discussions. To achieve this, we ask our students not to address their question specifically to the lecturer. Indeed we refrain from answering their questions for 24 hours unless the question is an urgent one.

Table 3

Mode	Bandwidth	Interaction	Targeting
Lecture	High	Low	Low
Tutorial	Low	High	Medium
Informal – asynchronous communication	Medium	Medium	High
Offline - synchronous communication	Low	High	High
CDROM-based	Medium-High	Low	

Architecture of Global Delivery

Computer based technology is central to global teaching. To support our students globally we are deploying server systems at each of the locations where our students are. For example in Hong Kong we have deployed an offshore server so that the students have quick access to all student materials. This offshore server is slaved to a computer inside our department in this way staff access the local server and student access the remote server – see fig 1. All materials are mirrored between the two servers. As we create new offshore teaching locations, a slave server will be installed locally. By this we distribute the student load among the offshore locations.
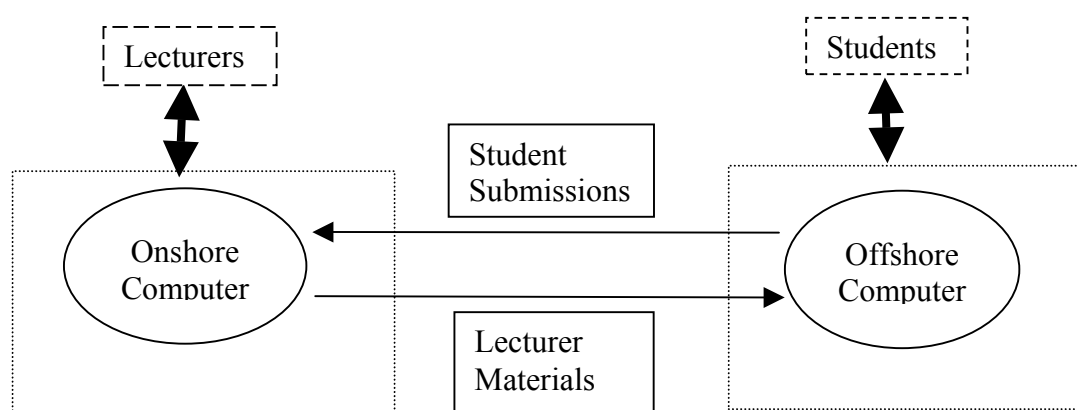

Figure 1

EVALUATION

Method

The general acceptance of electronic communication technologies by students involved in global education was tested by a voluntary survey in which 145 questionnaires were distributed to students in 3 different classes and 81 questionnaires were returned. In many cases only selected questions were answered and most others ignored. We concluded that the reason for the selective answering of questions was due to lack of comprehension or other more subtle cultural factors despite the fact that the final framing of the questions was done by a native Chinese speaker who lived and was educated in Hong Kong. This unfortunately made the task of applying statistical analysis to the results problematic but nevertheless the results do provide valuable information and are presented and discussed in the next section.

Results

Although our model of global teaching uses a mix of established media, we did nevertheless consider Rogers' rate of diffusion (Rogers 1993). This measures the rate in which students took up certain key innovations such as our policy on discussion and chat room after their first iteration.

Our survey indicated that nearly all students (96%) claimed to use and benefit from the Discussion Room (compared with 48% for the Chat Room). For non-personal queries it is the preferred form of electronic communication despite the fact that a question may remain unanswered for more than 24

hours. When asked which communication method they preferred to use for different enquiries the results shown in table 4 were obtained.

Table 4

	Discussion Room	Chat Room	Email
Social communication with other students	35	11	25
Asking specific questions related to assignments	55	18	26
Asking questions about the course content	46	14	33
Asking administrative type questions	28	5	49
Asking questions about assessment results	28	5	46

For students the most important fact is that they have time to compose a question and the students (or academic) who respond to the question have time to think through the answer. It also encouraged collaborative learning and the feeling of working in a group rather because several students often answered a question from varying perspectives, a fact not lost on the students themselves. Even in the case of questions that tend to relate to personal matters (such as questions related to administrative or assignment matters) a significant number of students still preferred to use the Discussion Room facility.

Chat Rooms are another matter to our Hong Kong students. In the survey students were asked whether they had any difficulty in expressing themselves using one of the communication technologies. The results are summarized in table 5 and indicate a very significant level of difficulty in the case of the Chat Room.

Table 5

	Very Difficult	Some Difficulty	No difficulty
Chat Room	13	52	15
Discussion Room	3	26	51
Email	1	26	53

The majority stated that this form of communication was too fast for their English ability and the pressure of keeping up leads to all sorts of misunderstanding. Nevertheless, when asked if the Chat Room should be an integral component of all courses, a significant majority (61%) stated that it should be. Furthermore (and rather surprisingly) only a small minority of students supported the notion of using Chinese in our communication facilities as shown in table 6. Many students followed up by stating that the reason they do not support the use of Chinese is because they see considerable benefit in being required to communicate in English. This response however needs to be further investigated given that our informal sampling clearly suggests that the most active Chat Room interaction occurs where the lecturer is a native Chinese speaker.

Table 6

	Very Desirable	Not Important	Not Necessary
Chat Room	13	42	23
Discussion Room	8	30	39
Email	7	28	42

The matter of improved communication was also tackled from another perspective. Students were asked to indicate their support for the provision of audio, video and drawing facilities for Chat Rooms. The results are summarized in the table 7.

Table 7

	Very Desirable	Not Important	Not Necessary
Voice Facility	16	28	34
Video Facility	23	31	21
Drawing Facility	47	19	7

The results support our perception that most of our Hong Kong students were not fluent in English and therefore did not strongly support the notion of using audio facilities (whereas our local students in another survey supported the use of an audio facility in Chat Rooms very strongly). The Hong Kong students generally were more supportive of video facilities possibly because of the perception that video would primarily be used by the lecturer. In contrast support for a drawing facility that does not require language fluency was very strong.

The survey also addressed the question of anonymity for users of Chat and Discussion Rooms. Surprisingly the results (shown in table 8) indicated that students were not in favor of total anonymity. However, a significant number of students strongly supported the notion of limited anonymity through the use of an alias (which does however allow a student to be identified by the lecturer). This result seems to contradict the fact that the usage of both Chat and Discussion Rooms increased very significantly when we implemented our own software that gave users of these facilities total anonymity and requires further research.

Table 8

	Strongly Agree	Don't Care	Strongly Disagree
Your Real Name	7	48	22
Alias Name	44	31	4
No Name	11	39	27

The Change to Global Teaching

Scott (1999 & 2000) states that the nature of educational change is uncertain, it operates in phases; it is cyclical not linear, it compromises a mix of factors beyond and within one's control; it is reciprocal meaning that one thing impacts upon another; and it requires educators who can 'read and match' or, in other words, respond and find solutions for individual needs. We analyze our experience in change management by addressing Scott's categories as set out in Table 9 below.

Table 9

Project name and short description	Bachelor of Computer and Information Science (E-Commerce)
In what way was the educational change uncertain?	The ability of lecturers to operate in global teaching mode where language and cultural issues are significant.
Were there phases in the change process? What were they?	The content and format of online material is constantly reviewed and redesigned. The use of computer technology is also constantly reviewed.
How was the process cyclical, if at all?	No cyclical processes have been noted as yet but the process of 'unbundling' a course and distributing responsibility to several people is one process that
Describe some of these factors as they relate to your educational change: 1. Factors beyond your control 2. Factors within your control	1. Student perceptions of quality and the commitment of all teaching and support staff to quality of service. 2. The technology and software tools.
Were there any reciprocal elements in the process where one thing influenced the development or change of another?	The redevelopment of the discussion room to one that gives students anonymity has lead to a rapid increase in the use of this tool. It leads to a marked decrease in the use of email whilst fostering collaborative learning.
Can you describe any elements of the change process that required special responses, where 'reading and matching' were required?	Global teaching is difficult to sustain if lecturers maintain total control of courses. Courses have been 'unbundled' and a course coordinator, a course manager and a helpdesk tutor support lecturers in every course.

CONCLUSIONS

In this paper we have presented a model of global teaching that, to date, has proved to be successful in terms of increasing student numbers, student satisfaction and sustained profitability. It also represents a model that maintains educational quality. Quality control in fact, is easier to achieve in our model of global teaching than in local teaching due to the integration of discussion and chat rooms into all courses, which gives a lecturer the ability to respond quickly and effectively to any problems or issues.

The innovation in our approach is in the combination of technology and traditional methodology. The approach outlined in this paper is not an experiment limited to several selected courses. On the contrary, it has been applied consistently to an entire degree program. Although the survey results indicate the need for further refinements our approach has proved to be successful despite a very significant economic downturn in 2002 and the SARS (Sudden Acute Respiratory Syndrome) epidemic in Hong Kong.

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