Interrogating the World Bank's Policy on Innovative Delivery for Higher Education

By

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Declaration

I hereby declare that this thesis is my own work except where stated to the contrary and that it is not substantially the same as any other thesis which has previously been submitted for a degree at any other university.

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Abstract

Over the past thirty years, the World Bank has intensified its activities relating to education in developing countries. Notable developments in the World Bank's policy on education include promotion of "innovative delivery", which refers to the use of new and existing Information and Communication Technologies (ICTs) in education. The World Bank claims that the unique characteristics of ICTs have the potential to produce new forms of delivery in higher education that can overcome existing barriers to education and facilitate student-centred learning (World Bank, 1999, 2005).

Many forms of innovative delivery, such as distance education and open learning, are not new forms of instruction. However, promotion of innovative delivery as a global priority for education in developing countries is new. In this thesis, I interrogate the World Bank's assumptions concerning innovative delivery as expressed in their landmark policy statement on education, the 1999 *Education Sector Strategy Report* (ES99) (World Bank, 1999). I focus on the assumptions that underlie views put forward in the ES99 on the nature of technology and its role in education, the role of innovative delivery in overcoming existing barriers to education, and the potential of innovative delivery to facilitate student-centred learning. A central aim of this thesis was to better understand the socio-cultural and pedagogical issues that may arise when these assumptions are put into practice in different cultural contexts. This was achieved by comparing the assumptions put forward in the ES99 with the reported perceptions of,

attitudes toward, and use of ICTs by students and lecturers from three different cultural contexts.

Qualitative and quantitative methodologies were used to gather detailed empirical data on end-users' perceptions, attitudes to and use of online technologies at universities in Australia, Malaysia and the United States. The findings suggested that across all three cultural contexts, respondents' attitudes were not consistent with the World Bank's technocratic view of innovative delivery. Moreover, the findings cast doubt on the extent to which technology-mediated education can overcome existing barriers to education and facilitate a student-centred approach to education. I conclude by suggesting that the World Bank needs to adopt a more questioning stance toward the potential effectiveness of innovative delivery. Other findings point to the contextual nature of technology adoption and the pedagogical implications of this mode of delivery across cultural contexts.

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Chapter One

The World Bank and Innovative Delivery

Background and Context

The World Bank (officially known as The International Bank for Reconstruction and Development) was formed in 1944 towards the end of World War II under the Bretton Woods agreement and in the political context of the Cold War. The main purpose of the World Bank is to provide loans, technical expertise and development assistance to developing countries. This is achieved by selling bonds in international capital markets and then lending this capital to member countries at rates that are affordable to them (World Bank, 2005a). Interest from the repayment of these loans provides the World Bank (hereafter referred to as "the Bank") with a viable income stream, making it more autonomous from its member governments than many other international institutions. By providing loans it is hoped that freer trade will be generated among the economies of developing countries, thus creating greater wealth for individual countries (Mundy, 2002).

The World Bank lends approximately $20 billion a year to poor countries and has maintained a central position in international affairs and global development. Yet the World Bank has also been the recipient of considerable criticism, perceived as having

restrictive loans and narrow, neo-liberal policies (Heyneman, 2003). The contradictory reports about the World Bank have led authors such as Mallaby (2004) to describe the Bank as "a strange kind of a bank, extremely good and frustratingly bad" (p. 3). However, the current development agenda is nevertheless explicitly shaped by the Bank's policies. As Mallaby (2004) put it, "The persistence of extreme poverty has fair claim to being the greatest outrage of our times, and the World Bank is the main instrument that rich nations have to fight it" (p. 1).

Education is seen by the Bank as an important way to reduce poverty and inequality, and promote sustained economic growth in developing countries (World Bank, 2005b). Over the past thirty years, the Bank has expanded its activities relating to education as part of its commitment to reducing world poverty. Perceived as the cornerstone of economic growth and essential for a country's democratic development, evidence for the Bank's commitment to education is seen in their new loan commitments for education, which increased from 2.9 percent in 1963 to 8.5 percent in 1999 (as percentages of total new loan commitments, World Bank, 1999). The Bank is now the single largest provider of expertise and finance to education in the developing world (World Bank, 2005b), giving the Bank a "quasi-monopoly" in the area of international aid for educational development (Bonal, 2004 p. 650). In absolute terms, the World Bank's loans and financing initiatives represent only a small percentage of a country's overall education budget; however, the conditional nature of the loans increases the Bank's influence on educational administration and management (Bonal, 2004).

Since the World Bank began lending money to developing countries specifically for education in 1963, the Bank has published five comprehensive policy statements

concerning education (World Bank, 1971, 1974, 1980, 1995, 1999). These documents were written to publicise the Bank's priorities for lending and in doing so, persuade governments and other aid agencies to adopt the Bank's approaches to development (Jones, 1997). The documents were also intended to inform and guide educators working within the field of international education (Samoff, 1996). Each policy statement is considered important because of the influence that the policies have had on the rhetoric and practice of global education (Klees, 2002).

The most recent substantial policy statement is the 1999 *Education Sector Strategy Report* (hereafter referred to as the "ES99"). The ES99 was the first overall policy statement published by the World Bank in almost twenty years and demonstrates the Bank's increased commitment to education (Mundy, 2002). The ES99 reflects considerable changes to the methodologies and approaches used in development, emphasising more flexible approaches and strategies than those outlined in previous World Bank documents (Bonal, 2004). In 2005, the ES99 was augmented by the *Education Sector Strategy Update* (ESSU), which as the title implies, builds on the policies put forward in the ES99. The ESSU gives more detailed consideration to integrating education into a countrywide perspective, broadening strategies through a system-wide approach and becoming more results-oriented (World Bank, 2005). However, the intentions laid out in the ESSU are largely the same as those in the ES99 and are more explicitly defined than in the ESSU; thus, the policies in ES99 are the primary focus of the thesis presented here.

The vision for education reflected in the ES99 includes a basic quality education for all and the promotion of skills perceived necessary for people to survive in a globalising

world (Soudien, 2002). This vision is stated in four global priorities for education, which are: Basic Education (for the poorest sectors and for girls); Early Interventions (early child development and health in education); Innovative Delivery (distance education, open learning and the use of new technologies); and Selected Areas of System Reform (standards, curriculum and achievement assessment). These strategies are to be implemented in different developing countries in collaboration with Non Government Organisations (NGOs) and other aid organisations (World Bank, 1999).

The importance attached to "Innovative Delivery" as a global priority is reflected in part by the Bank's loan commitments to it. Current estimates in 2005 suggest that lending for education averaged approximately US$2 billion per year (World Bank, 2005b). From this total lending commitment, the Bank estimates that over 80 percent of all their education projects now include Information and Communication Technologies (ICTs) of some kind. These components range from distance education (print and radio as well as video-conferencing, computers and the Internet), educational technology, information and communication technology (ICT) and education management information systems (World Bank, 2002b; World Bank, 2005b). The Bank has increased its support for the use of ICTs in aid efforts by providing assistance for the use of technology in equipment and facilities, teacher training and support, capacity building, educational content, distance learning, technological literacy, education policy and media (World Bank, 2005b). In actual figures, estimates in 2003 showed that lending for technological components in education ranged from U.S. $150 million to $500 million per year (World Bank, 2003).

Investments in innovative delivery are substantial, and thus expectations for its success are set high. As one of four global priorities, innovative delivery is predicted to "have a big impact on the quality of teaching and learning" (World Bank, 1999 p. ix). Innovative delivery is considered to have relevance for all levels of education; however, it is seen as having particular application in higher education (World Bank, 2003). The Bank's recent publication titled, *Higher Education in Developing Countries: Peril and Promise* (2002) described the importance of innovative delivery in higher education, stating: "The Task Force believes that distance education offers many exciting possibilities. Innovative curricula can be combined with interactive, internet-based technology, traditional educational media such as television and print, written materials, and direct contact with tutors" (p. 49).

Implementation of innovative delivery (or "technology-mediated education" as it is sometimes referred to) is illustrated in the ES99 by the African Virtual University (AVU), located in Nairobi, Kenya. The AVU was first launched at Kenyatta University as a World Bank project in 1998 as a "first of its kind, satellite-based distance education project" (World Bank, 1999 p. 2). The AVU now operates independently of the World Bank; however, the description of the AVU offered in the ES99 nevertheless provides insight into the World Bank's conceptualisation of innovative delivery and their intentions for future projects based on similar models.

The initial aim of the AVU was to harness "the power of interactive satellite and computer-based technologies" to draw on academic faculty, library resources and laboratory experiences from internationally recognised universities (World Bank, 1999 p. 2). This was to be achieved by broadcasting educational programs from the U.S. and

Europe via satellite to partner institutions in Africa (Amutabi and Oketch, 2003). The

intention was that local teachers in the partnering institution would review, customise

and if necessary, translate the unit materials into the local language.

The AVU learning package included live, pre-recorded lectures transmitted by the host

institution via satellite to be viewed by students at the partnering institution on a

television screens. Handouts, textbooks, lecture guidelines, programs, schedules and

other materials were delivered also electronically (Amutabi and Oketch, 2003). The

Bank described the learning package as follows:

> The African Virtual University uses a mixture of taped and live lectures
> delivered by one-way video digital satellite broadcast with two-way audio and
> email interaction between learners and instructors, supplemented by textbooks,
> course notes and learner support in the classroom from facilitators (World Bank,
> 2003 p. 49).

It must be emphasised that the online learning resources used in the World Bank's

projects were promoted as *optional* or as *supplements* to the conventional face-to-face

learning resources already available at the learning institution; the intention was not to

provide fully online units of study. The role of the Bank was to support countries by

helping them explore the potential of new technologies while managing constraints such

as limited infrastructure (World Bank, 1999).

By "harnessing the power" of new and existing technologies in this manner, the World

Bank argued that the AVU and similar programs can "contribute to overcoming the

existing barriers . . . to higher education" and "better position countries in sub-Saharan

Africa to be part of the global information age and the new knowledge economy"

(World Bank, 1999 p. 2). Innovative delivery is thus seen as a way to increase access to

education and improve the quality of existing programs, promoting greater opportunity for students to develop the skills and competencies relevant to the present globalising world (World Bank, 1999).

The AVU and similar programs have been termed "transnational education" by the United Nations Educational, Scientific and Cultural Organisation (UNESCO), and defined as:

> All types of higher education study programmes, or sets of courses of study, or educational services (including those of distance education) in which the learners are located in a country different from the one where the awarding institution is based. (UNESCO, 2001 website)

Although many forms of transnational education (such as distance education and open learning) are not new forms of instruction, the immediacy of global communication and instantaneous sharing of information facilitated by new technologies is a new phenomenon (Currie, 2003). The promotion of free and liberalised trade across national borders by globalising agencies such as the World Trade Organisation (WTO) and the General Agreement on Trade in Services (GATS) have contributed to the expansion of innovative delivery (Mohamedbhai, 2002). Other contributing factors are the perceived potential of technology, fuelled by the affordability and accessibility of ICTs, as well as the demand for more flexible and tailored modes of education in the knowledge economy (Cunningham, Tapsall, Ryan, Stedman, Bagdon and Flew, 1998).

Innovative delivery may be thus positioned within what Arrighi (1998) described as "the globalisation thesis", a view that sees current global trends as "not novel except for their scale, scope and complexity" (Arrighi as quoted by Currie, 2003 p. 477-478). Given the financial position of the World Bank, coupled with the intensification of

globalisation and the worldwide demand for more education, it seems likely that the promotion and implementation of innovative delivery is set to continue.

Innovative delivery and the Bank's imperatives for education

The World Bank's long-term goals for education include the provision of a basic education for all people as well as the provision of advanced higher education. Former World Bank president, James Wolfensohn, stated that:

> All agree that the single most important key to development and to poverty alleviation is education. This must start with universal primary education for girls and boys equally, as well as an open and competitive system of secondary and tertiary education. (Wolfensohn as quoted by the World Bank, 1999 p. iii)

Critical thinking skills, independent learning and problem solving abilities across all levels of education are considered fundamental for successful participation in the knowledge economy. Soudien (2002) explained that the knowledge economy has facilitated a major restructuring of the nature of work and knowledge production, requiring people to perform more specific and specialised tasks than in the industrial age (Soudien, 2002). Access to education is thus perceived as a crucial requirement for participation in the global knowledge economy (World Bank, 1999; World Bank, 2002a). The Bank argued further that a country's development depends on its capacity to, "take advantage of the knowledge economy" by generating and sharing knowledge (World Bank, 2002a p. 14). This aims were clearly stated in the ES99:

> Education is vital: those who can compete best (with literacy, numeracy, and more advanced skills) have an enormous advantage in this faster paced world economy over their less well prepared counterparts. (World Bank, 1999 p. 1)

Although the literature on the history of educational technology has revealed a series of failures (see for example, Gladieux, 2000; Kilker, 2000; Noble, 2000), innovative delivery is nevertheless seen by the World Bank as an important way to *increase access to education*. It is believed that innovative delivery can offer more people an education by bringing about independence of time, location and learning. The aim is to tap into the potential of new ICTs to overcome many financial and physical barriers to education through online education (Amutabi and Oketch, 2003).

In addition to increasing access to education, innovative delivery is also viewed as a way to *improve the quality of education*. World Bank consultants, Grace and Kenny (2003) commented on the role of ICTs in the learning process and argued that technologies can provide students with access to modern pedagogical methods and knowledge, such as student-centred learning and critical thinking (Grace and Kenny, 2003). The benefits of improved access and educational quality facilitated by innovative delivery are considered important in fostering the development of citizens who are able to contribute to the society and the economy. These aims were expressed in the Bank's publication titled, *Lifelong Learning in the Global Knowledge Economy: Challenges for Developing Countries*:

> ICT has the potential to improve the quality of learning, expand access to learning opportunities, and increase the efficiency of administrative processes. These technologies can support changes in pedagogy and teacher training, deepening and extending planned changes. (World Bank, 2003 p. 36)

This vision for education is also stated in the ES99, which stated that innovative delivery will "expand access and improve quality" as well as "provide unprecedented opportunities to change education itself" (World Bank, 1999 p. 2). The potential of innovative delivery is described in the ES99 as follows:

Existing and new technological possibilities (distance education using print and radio, TV, and the Internet) can reduce costs, increase access, expand the range and quality of education and training options, open up new worlds in classrooms and communities, and make real the promises of lifelong learning. (World Bank, 1999 p. ix)

In short, the ES99 puts forward three major claims in support of innovative delivery, namely that technological innovations will:

➢ "likely have the most far-reaching implications";

➢ "provide people with virtually unlimited access to information"; and

➢ "fundamentally rethink what should be learned and how" (World Bank, 1999 p. 2).

Potashnik and Adkins (1996), World Bank consultants, argued that as developing countries gain experience with ICTs, countries may "leapfrog" forward in economic and social development. Potashnik and Adkins (1996) believed that greater access to information would lead to better economic organisation, better global communications and more efficient productivity. In a similar vein, another World Bank consultant, Juma (2001), wrote that innovative delivery in Sub-Saharan Africa "provides a reason for hope" (p. 229). Juma (2001) claimed that, "The new global economy has the potential to create opportunities for developing countries to leapfrog developmental steps and constraints and speed up the developmental process" (p. 299). As one of the four "global strategic priorities" mentioned earlier, innovative delivery thus forms a central role in the Bank's approach to educational development. Klees (2002) described the Bank's vision of education as "totally oriented towards technology, with 7 days a week, 24 hours a day access to beamed-down data from over the world" (p. 453).

The belief that educational problems can be solved when people have access to technology has been described by Leo Marx (1987) as *technocratic*, a view that sees technology as bringing about improvements in power, efficiency and rationality as ends in themselves. According to Marx (1987), the technocratic idea of progress is a belief that scientific and technological innovation is the basis for general progress. Similarly, Neil Postman (1992) referred to the current emphasis as a "technopoly" – that is, our (Western) culture's "submission of all forms of cultural life to the sovereignty of technique and technology" (p. 52).

The World Bank is not the only international organisation to promote innovative delivery in education. For example, the United Nations Development Programme (UNDP) was similarly supportive of innovative delivery, stating that technology is a powerful tool for "improving the delivery of basic services . . . UNDP helps countries draw on expertise and best practices from around the world to develop strategies to expand access to ICTV and harness it for development" (UNDP, 2006 website). However, because of the Bank's explicit reference to and clear focus on innovative delivery, the views expressed by the World Bank are the focus of the thesis presented here.

Questioning the Technocratic view

Not all commentators share the Bank's optimism and enthusiasm for online learning. The first assumption put forward by the Bank (that innovative delivery will "likely have the most far-reaching implications") implies that the World Bank regards technology in education as both a necessary and positive component in education. This technocratic

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view on the nature of technology and its role in education has been widely criticised (see for example, Feenberg, 1999; Ferneding, 2003; Kerr, 1996; Marx, 1987; Newson, 1995; Winner, 1977). Skeptics of online education have pointed to the power of the internet to deliver one brand of knowledge (see for example, Newson, 1995; Noble, 2000). Some commentators are concerned that cultural issues related to the use of e-learning have been neglected (Joo, 1999) and others have discussed the potential of transferring a Western world view through internet based instruction (Lauzon, 1999). Joo (1999) claimed that the intensification of globalisation has promoted the global diffusion of electronic technologies, which may reduce cultural and language differences among cultures. Other writers have argued that there is the potential for "cultural imperialism" in the use of technology, particularly with respect to the "Americanisation of education" (Cunningham, et al., 1998 p. 163). Ziguras (2001) maintained that these tendencies must be avoided in order to minimise the potentially negative effect of globalisation on the diversity of cultural traditions. Similarly, Vargas (2000) claimed that sustainable education must respect local cultural contexts, particularly in the transfer of technology and educational materials from one country to another. McLoughlin and Oliver (2000) argued that the design of web-based instruction is not culturally neutral, but based on the epistemologies, learning theories and goal orientations of the designers in particular cultures. Because the majority of centres for producing knowledge are in the United States, this could lead to technological imperialism and possibly cultural imperialism, if only one part of the world produces knowledge and educational content for the other part to consume (Currie, 2003a).

The second assumption put forward by the Bank (that innovative delivery will "provide people with virtually unlimited access to information") reflects the Bank's optimism concerning the potential of innovative delivery to overcome barriers to education. Commentators have suggested that innovative delivery may not necessarily achieve this goal (see for example, Abbott, 2001). Some have argued that the internet is a tool for the "virtual elite" that can actually exacerbate the divide between rich and poor countries (Uimonen, as quoted in Main, 2001 p. 96). Even commentators within the World Bank, such as Grace and Kenny (2003), were sceptical about the potential of innovative delivery to play a substantial role in development, arguing that such programs have so far been very expensive and few programs have undergone formal evaluation.

Lastly, and in regard to the third assumption that technological innovation will provide unprecedented opportunities to "fundamentally rethink what should be learned and how", some writers have argued that there is little scientific evidence in support of technology in enhancing teaching and learning (see for example, Ellis, 2001). Scholars have raised concerns about the pedagogical effectiveness of technology-mediated education in different cultural settings. Collis (1999a) and McLoughlin (1999), for instance, appraised the use of e-learning in cross-cultural settings and found that cultural context had a substantial impact on the acceptance, use and impact of computer-related interventions. Other scholars examined cultural issues relating to technology-mediated learning and suggested that cultural context is an important factor in the design of online learning systems (Chen, Mashhaki, Ang and Harkrider, 1999; Wild, 1999). Moreover, other authors have expressed concern that socio-cultural differences (Sofield, 2000) and language difficulties (Briguglio, 2000) may present problems when educational

programs are developed and delivered across national borders. Similarly, Wild (1999) suggested that the internet is not always chosen for its instructional effectiveness, nor is it a medium particularly suited to carrying a range of information types for culturally diverse learners (p. 196).

These studies raise questions about the extent to which the World Bank's aims for innovative delivery can be achieved. Innovative delivery is presented as a strategy that will solve a broad set of problems, yet little consideration is given to the complex nature of transferring educational materials transnationally via the internet. In particular, little consideration is given to the array of philosophical, cultural, pedagogical and practical issues that may arise during the implementation of innovative delivery. The simplistic approach adopted by the World Bank may mean that innovative delivery actually reinforces some of the negative aspects of existing educational systems. As Ellis (2001) pointed out, the "cost of multimedia production is so very great that, should it not prove effective, our educational system could be seriously impacted" (p. 107).

To my knowledge there has been no in-depth study on the World Bank's policy on innovative delivery in higher education. To date, no studies have focused on the theoretical and practical issues concerning the World Bank's conception of innovative delivery, and in particular, no studies have specifically focused on the potential influence of cultural and pedagogical differences on technology-mediated education. Current rhetoric at the World Bank poses questions such as "Can technology do X?" and "Can innovative delivery achieve X goals?" Yet, to date, few scholars have questioned the World Bank's position by asking, "Do we really want technology to do

X?" and further, "What is the impact of technology on teachers and students in different cultural contexts?"

That such fundamental questions are overlooked by the World Bank is regrettable because, firstly, substantial financial investments are directed toward innovative delivery. Education policies may affect the educational experiences and opportunities of many people and it is potentially financially wasteful and ineffective to base decisions on an unexamined set of assumptions. Secondly, it is likely that the role of culture and pedagogy in technology-mediated education would need to be considered to avoid forms of cultural ethnocentrism (Reagan, 2000). That empirical evidence on these issues is scarce means that the basic vision for innovative delivery may be unrealised and further, cultural ethnocentrism may be fostered by the Bank's practices and policies.

Given these concerns, a central aim of this thesis was to interrogate the World Bank's assumptions concerning innovative delivery by examining how students from diverse cultural contexts perceive online resources, which factors influence their use of the technologies, and how the technologies are actually used in learning. To this end, I considered the extent to which the perceptions of, attitudes toward, and use of online resources by students' and teachers' from different cultural context reflected the World Bank's aims for innovative delivery.

Focus and Structure of the Study

The purpose of this thesis was to interrogate three claims concerning the World Bank's policy on innovative delivery, as expressed in the ES99:

- ➢ that innovative delivery is both a necessary and positive component of higher education;

- ➢ that innovative delivery can overcome existing barriers to education; and

- ➢ that innovative delivery can facilitate a student-centred approach to education.

A mixed methods approach that incorporated both quantitative and qualitative data was used to examine the perspectives from groups of students at higher education institutions located in three different cultural contexts. Australia, Malaysia and the United States were chosen as research sites from which to examine students' attitudes to and use of online resources offered as supplements to existing teaching and learning resources. Where relevant, comments from the students' lecturers were also included to explicate the issues raised by students.

Australia, Malaysia and the U.S. were selected as sites for comparison because the U.S. was considered to be advanced in its use of technology in higher education. Australia was considered to have a "medium level" use of technology in education and was relevant to the author's own educational context. Malaysia was considered to have a middle-income economy and beginning to implement online resources in its higher education institutions. Also, the author's host university has existing collaborative ties with institutions in Malaysia.

A questionnaire with Likert-style rated questions was developed for the purposes of this study and used to assess students' attitudes to and use of technology (dependent variables). Statistical analyses were used to identify the relationships between students' cultural context and their attitudes to and use of online resources. One university in Australia, two private colleges in Malaysia, and one university in the United States were selected as the study sites from which to invite student participation. The Malaysian colleges were partnering with the Australian university in a twinning arrangement[1] and online resources were featured prominently in this program. These universities and colleges were considered representative of reasonably well-funded state higher education institutions in each cultural context. Each university varied in the extent and time to which online resources were offered as part of educational provision. Thus, these cultural contexts formed the independent variable of interest.

The present study applied the Rasch Measurement Model for analysis of the questionnaire data (Andrich, Lyne, Sheridan, and Luo, 2003). Traditional Test Theory (TTT) is commonly used to analyse variables such as attitudes and behaviour; however, the Rasch Model was used because it provides a more "objective" method for measuring the manifestation of latent traits (such as attitudes and behaviour) than TTT

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[1] The Australian Vice-Chancellors' Committee (AVCC) (2003) state that twinning arrangements contain the following elements:
- The program is conducted in accordance with a formal agreement between the Australian university and an overseas institution or organisation;
- The program offered is taught partly or wholly offshore (distance education programs to be included only when there is a formal agreement with an overseas institution/organisation to participate in some way in their delivery);
- The completed program results in a recognised higher education qualification;
- The Australian university has developed the program and has a responsibility for overseeing the academic standards.

(Andrich, 2004). Specifically, the Rasch model requires the data fit the model, whereas TTT requires the model to fit the data. When the data fit the model, the items on the scale are considered to form a single variable. The construct validity that can be achieved through the Rasch model means that the findings generated could be considered a reliable and valid measure of students' attitudes to and use of online resources. Thus, the Rasch model strengthens the validity of the findings presented in this thesis and gives a more robust understanding of the interaction between the questionnaire items and participants than TTT could provide.

Although the Rasch Measurement Model has been used extensively in many areas of educational research (see for example, Andrich and Styles, 2004; Waugh, 1999), to date, few cross-cultural studies have used the Rasch model because it is relatively new to cross-cultural research in social psychology. As previously mentioned, the Rasch model requires that the data fit the model, which is a substantially different approach to measurement that is only just beginning to emerge in mainstream social psychology. To my knowledge, only one study has used the Rasch model in cross-cultural research (Snider and Styles, 2005). Thus, from a methodological perspective, this study is unique in its use of the Rasch Measurement Model and contributes to the body of literature on cross-cultural studies that have applied the Rasch model to examine attitudes and behaviour.

Qualitative methods were also used to examine students' attitudes to and use of online technologies. These methods were used to glean insights that were not obtainable by using quantitative methods alone and included interviews, focus groups and responses to open-ended items in the questionnaire. The theoretical frameworks identified in the

relevant literature are described in Chapter 3 were used to explain the trends observed in the qualitative data. The mixed methods approach thus strengthened the validity of the findings presented in this thesis.

It must be recognised that any cross-cultural analysis will invariably detect differences due to cultural context. Also, attempts to compare 'cultures' *per se* will be limited by the fact that cultural groups themselves are never homogenous. As Eldridge (2002) pointed out, cultural boundaries are obscured by "seepage of a global cosmopolitan civilisation" (p. 4). Similarly, Chen et al. (1999) argued that there is no "pure" culture since all cultures are constantly evolving and changing. Even within cultural groups there are often marked differences based on education, class, religion and other background characteristics. Nevertheless, fundamental differences between "Western" and "non-Western" cultural and educational traditions have been identified (see for example, Nisbett, 2003). Although this classification carries with it problems of stereotyping, oversimplification and biased assumptions, there are nevertheless general characteristics that may be attributed to "Western" and "non-Western" cultures (Reagan, 2000). These characteristics are referred to and elaborated on in this thesis.

A unique feature of this research is its comparison of three cultural groups, namely, Australia, Malaysia and the United States. Although Australia and the United States share many similarities, there are also marked cultural differences between the nations. By comparing end-users' attitudes from Australia and the United States, this study contributes to the sociological understanding of differences and similarities between Western nations. As Volet (1999) noted, "relatively little attention has been given to the fact that the Western world is not homogenous" (p. 191). The present study also

examined perspectives from a non-Western nation (Malaysia), which gives insight into the commonalities and differences between Western and non-Western nations.

An important caveat to note with the present study is that while its aims were to compare students and lecturers interactions with ICTs in different cultural settings, the study was not designed as a formal comparison in the sense of a controlled experiment. Rather, actual real-world implementations of ICTs, which differed from institution to institution, were analysed; this approach holds both advantages and disadvantages in terms of the extent to which comparisons are valid.

In summary, this research aimed to interrogate the World Bank's technocratic policy on innovative delivery for education. This was achieved by examining how students from diverse cultural contexts perceive online resources, what factors influence their use, and how the students use these technologies in their learning. Combining qualitative and quantitative methodologies provided breadth and depth to the analysis of teaching and learning with online technologies. This study was undertaken during the implementation of the global priorities described in the ES99 (and augmented in the 2005 ESSU) and therefore its timing is of strategic value in highlighting issues relevant to the conceptualisation and implementation of innovative delivery in developing countries. The findings from this research form a basis for theoretical and practical recommendations for using innovative delivery as a development strategy and may contribute to the development of future education policies by aid organisations such as the World Bank.

Research Questions

Four main research questions, each with a set of more specific questions, were developed to guide the study. These questions and their subsets are as follows:

1. What are students' attitudes to the nature of technology and its role in higher education?

➢ To what extent do students believe that technology is a necessary and positive component of higher education?

2. To what extent can innovative delivery overcome existing barriers to education?

➢ What factors influence students' use of the technology enhancements?

3. To what extent are students' attitudes to and use of online technologies consistent with the principles of student-centred learning?

➢ Do students view the online resources as influencing the roles of teachers and students?

➢ Do students use the online resources in a way that facilitates high-level learning and critical thinking?

➢ Do students use the online resources for collaborative learning online?

4. What are the commonalities and differences between students' responses to questions 1, 2 and 3 (above) and the World Bank's policy on innovative delivery?

Overview of Thesis Chapters

Chapter 2, titled *Innovative Delivery: Insights from a Historical Perspective*, aimed to contextualise the World Bank's statements on innovative delivery (as expressed in the ES99) by reviewing the Bank's six major policy documents on educational reform. I trace the Bank's conceptualisation of innovative delivery since 1971, giving primacy to the 1995 *Priorities and Strategies for Education* (PS95), the 1999 *Education Sector Strategy Report* (ES99) and the 2005 *Education Sector Strategy Update* (ESSU).

In Chapter 3, *Innovative Delivery and the Role of Cultural Context*, I further investigate the World Bank's claims on innovative delivery by considering the three assumptions of interest in relation to the relevant theory that each assumption implies. In this chapter, I draw on the theories embedded in three bodies of literature: the philosophy of technology (theories concerning to the nature of technology and its role in society); the diffusion of technological innovations (theories concerning technological adoption and barriers to technological use); and student-centred learning (theories concerning pedagogy and online technology). These theoretical frameworks were then used as a lens with which to view the role of cultural context in technology-mediated education.

In Chapter 4, *Methodology,* I discuss the methodological approach taken in this research and its implications for the research design. I describe the research sites, the participants involved in this research and the development of the qualitative and quantitative data collection methods. The analytical methods used to analyse the data are also discussed.

In Chapter 5, *Validation of Scales*, I examine the reliability and validity of the sub-scales contained in the questionnaire by using a variety of psychometric analyses and qualitative evidence. I describe the Measurement theory, the Rasch Measurement Model and the computer software used in the analysis (Rasch Unidimensional Measurement Models, RUMM 2020). The reliability and fit of items to the model are also examined and presented.

The findings from this research are presented in Chapters 6, 7 and 8. Each chapter addresses one of the three central assumptions put forward by the World Bank. The analyses compared the attitudes to and use of technology by students and their lecturers to the attitudes and objectives espoused by the World Bank.

The first analysis presented in Chapter 6 focused on the assumption that *technology is a necessary and positive component of higher education*. Using the qualitative data generated from interviews, focus groups and responses to open-ended items in the questionnaire, I characterise and describe Australian, Malaysian and U.S. students' attitudes to the nature of technology and its role in higher education and compare these attitudes to those of the World Bank.

In the second analysis (Chapter 7), I investigate the assumption that *innovative delivery can contribute to overcoming existing barriers to education*. The chapter begins by reporting the quantitative findings based on the standard statistical analyses conducted using the linearised scores (logits) generated from the Rasch analysis. In the second section of the chapter, I report the qualitative findings from the responses of students in the three selected cultural groups on the factors that influenced their use of the online

resources employed in the units of study at their university. Identifying the factors that influenced or constrained students' use of online resources gives insight into the potential of innovative delivery to overcome existing barriers to education.

The third analysis (Chapter 8) investigates the World Bank's claim that *innovative delivery can facilitate student-centred learning.* This chapter begins by presenting the quantitative findings from the statistical analyses conducted using the linearised scores generated from the Rasch analysis. Qualitative findings are presented on the extent to which students' attitudes to and use of online resources was consistent with the principles of student-centred education. To further elucidate the issues raised by students, comments from the students' lecturers on technology-mediated education are included in the analyses presented in Chapters 6, 7 and 8.

Chapter 9 discusses, interprets and integrates the qualitative and quantitative findings presented in Chapters 6, 7 and 8 with reference to the four main research questions. Key issues resulting from the findings are considered in relation to the World Bank's conceptualisation of innovative delivery in educational reform. Chapter 10 concludes by considering the implications and possible applications of the findings, as well as the limitations of this research.

Summary

The purpose of this thesis was to examine the World Bank's conceptualisation of innovative delivery as a development strategy. It aimed to interrogate the World Bank's technocratic policy on innovative delivery for education and sought to examine the

potential influence of culture and pedagogy on technology-mediated education. This thesis offers a critical perspective, but it is not intended to be anti-technology. It is not the author's goal to take a stance against technology or its potential to introduce innovative forms of educational delivery to developing countries. Technology-mediated education can play an important role in education and is potentially beneficial in development efforts. Nevertheless, the assumptions and ideological framework that underlie the World Bank's statements on innovative delivery in the ES99 deserve careful examination; this process is essential to assess the worth of the World Bank's efforts concerning technology in education. The Bank's aims for technology might well appear sound, and yet there may be far reaching impacts of such innovations on existing teaching and learning practices. This research offers an analytical framework within which to view taken-for-granted assumptions about technology in education and the potential effectiveness of innovative delivery in educational reform.

Chapter Two

Innovative Delivery: Insights from a Historical Perspective

Introduction

The 1999 *Education Sector Strategy Report* (ES99) is the World Bank's most recent substantial policy statement on education in almost twenty years. The ES99 describes the Bank's global and country priorities for education and is regarded as an important document because of the influence that previous World Bank policies have had on global educational reform in developing countries. As mentioned in Chapter 1, the ES99 was augmented by the 2005 *Education Sector Strategy Update* (ESSU); however, the priorities stated in the ESSU are largely the same as in the ES99.

Notable developments in the ES99 include the promotion of "innovative delivery" (the use of new and existing technologies in distance education and open learning) as one of four global priorities for education in developing countries (World Bank, 1999). Although considerable attention has been given to the development approaches embedded in the ES99 (see for example, Bonal, 2004; Ilon, 2002; Klees, 2002; Mundy, 2002), little attention has so far been given specifically to the role of cultural context or the pedagogical implications in innovative delivery.

The purpose of this chapter is to contextualise the World Bank's statements on innovative delivery as expressed in the ES99 by reviewing the Bank's major policy documents on education (World Bank, 1971, 1974, 1980, 1995, 1999 and 2005). The Bank's education policies are not static (Jones, 1997), and as the World Bank put it, their policy documents are "updated and re-presented on a cyclical basis" and are "evolving instruments" (World Bank, 2002c p. 430). Nevertheless, reviewing a selection of the Bank's published documents over a thirty-year period gives insight into the Bank's approach to education and provides a framework for assessing the World Bank's statements on innovative delivery.

In this chapter, I trace the Bank's conceptualisation of innovative delivery since 1971, giving primacy to the recent publications: the 1995 *Priorities and Strategies for Education* (PS95), the 1999 *Education Sector Strategy Report* (ES99) and the 2005 *Education Sector Strategy Update*. Although lending specifically for education did not begin until 1963, I begin by describing the Bank's mandate and approach to development since its establishment in 1944. This highlights how the Bank's approaches to development have shaped subsequent policies on education. In the next section, I discuss the Education Sector Strategy Reports published during 1960-1990 (World Bank, 1971, 1974 and 1980). I then examine the policies published during the 1990s and conclude the chapter by discussing some insights that can be gained from analysing the evolution of innovative delivery in World Bank policies.

The World Bank: 1944-1960

Following the Bank's establishment in 1944, a central goal was to provide capital and infrastructure for post World War II reconstruction (Mundy, 2002) and lend money to newly emerging developing countries (Heyneman, 2003). Although the term 'developing country' is now largely taken-for-granted, according to Esteva (1992), the meaning of "underdevelopment" was reconceptualised at the end of WWII (p. 7). Esteva (1992) explained that the term "developing country" emerged in the language of aid agencies' documents largely because of U.S. post-war political actions and policies. For example, the launching of a U.S. global political campaign in January 1949 made the powerful post-war position held by the U.S. explicit. The campaign coincided with the beginning of President Truman's office and, among other effects, signalled a new era in development (Pulliam and Van Patten, 2003). Truman's inaugural address stated:

> We must embark on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of underdeveloped areas. The old imperialism – exploitation for foreign profit – has no place in our plans. What we envisage is a program of development based on the concepts of democratic fair dealing. (Truman as quoted by Esteva, 1992 p. 6)

By using the term "underdeveloped" within the context of maintaining U.S. superiority, Truman altered the meaning of development and created a new conceptual understanding of development that, in effect, referred to a new era of U.S. domination and control (Esteva, 1992). Mallaby (2004) also maintained that the World Bank was established with the role of achieving two central purposes: to relieve human suffering, as well as manage the economic chaos that threatened the rich world's security. The distinction between "developed" and "underdeveloped" nations was further nurtured by the 1950s culture of 'winners' and 'losers' embedded in social Darwinism, and by the

1970s, the politicised division was taken-for-granted and expressions such as "the North and the South", "the first world and third world" and "the core and the periphery" were routinely used in discussions on the hierarchical divide between nations (Amutabi and Oketch, 2003).

Within this post-war conceptualisation of development, policy makers began searching for material, historical and theoretical causes for "underdevelopment" (Fujikane, 2003). The Bank's attempts to fix problems of "underdevelopment" were generally framed within maintaining their own interests, and in particular, the focus on post-war reconstruction and infrastructure creation was based on the experience of Western nations, which was not necessarily relevant to the situation of non-Western nations. Policies emerged primarily from the experience of the Western policy makers which they believed would naturally produce upward social mobility and economic equality in underdeveloped nations (Farrell, 1982). This approach was supported by the Bank's wealthiest and most influential members, especially the U.S. (Mundy, 2002).

Policy makers believed that economic growth based on human capital theory was the primary engine of development. They believed that if developing countries had sufficient investment capital (the per capita production of material goods), self-sustaining growth would follow (Mallaby, 2004; Mundy, 2002). Modernisation theory was favoured and strategies focused on achieving set stages of development that involved the promotion of techniques that aimed to accelerate the transition from one stage to the next (McLean, 1981). It was believed that economic development could be achieved by transferring capital, technology and other goods and services from high-income countries to low-income countries (McLean, 1981). This narrow conception of

development effectively reduced a nation's growth to per person income, thus directing countries toward Western forms of capitalist development (Foster-Carter, 1985).

These trends serve to illustrate a pattern in the Bank's approach to development. As we have seen, the Bank's ambitions were largely framed within maintaining post-war interests. Attempts to fix development problems were based on Western perspectives and experiences, which tended to focus on narrow, economic-driven means to development. Investments were made because they were "cost-effective", "efficient" or yielded a "high rate of return" (Heyneman, 2003). These approaches did not give proper consideration to the particular social, cultural and political context of individual countries, which necessarily influences the success of any development strategy (McLean, 1981).

Education came into focus in the World Bank during the 1960s and was shaped by these views on development. To some extent, the next 30 years were those when investment in human capital was one of the primary goals of the Bank. It was thought that the production of manpower would provide developing countries with the investment capital needed to be self-sustaining and thus be the magic key to economic development. On this basis, the World Bank began focusing on education, training and other areas of "human capital" investment (Mallaby, 2004 p. 26)

Education Policies: 1960-1990

Education became a prominent feature of the World Bank's policy under the presidency of Robert McNamara during the 1960s. McNamara increased the size and scope of the

Bank's lending in education, which Jones (1997) described as the "McNamara revolution" (Jones, 1997 p. 120). During the McNamara years, the Bank maintained its post-war interest in the development of infrastructure and as a result, all education investments were justified on the basis of "manpower demands" (Heyneman, 2003).

The first loan for education was granted in 1963 and provided capital to "priority education projects" on very restricted lending terms (Bujazan, Hare, La Belle and Stafford, 1987 p. 163). Support was only given to projects that increased the number of technicians and engineers needed for the construction of infrastructure; thus, lending was concentrated towards technical and vocational education (Mundy, 2002). Other parts of the education sector, such as art, science, the humanities, primary and secondary education, as well as post-graduate education and library resources were generally overlooked. Lending to these areas was often prohibited because these subjects did not fit into the overall agenda of the Bank's lending program. Efforts toward generating human capital effectively turned the focus away from many other educational issues of concern such as teaching and learning practice (Heyneman, 2003).

During the early decades of the Bank's lending for vocational education, many interventions were often inappropriate for the needs of the local context (Heyneman, 2003). For example, during the 1970s, secondary vocational education programs included woodwork for boys and domestic science for girls. In Somalia, for instance, these 'practical' subjects included the use of electric cookers for girls who had never before seen an electric stove. The boys' woodwork classes required metal, cement and wood; however, because wood was often not available locally in Somalia, it had to be imported from Europe (Heyneman, 2003). The lack of attention given to the local

context and culture, coupled with the Bank's single-minded concern for building manpower production, led to development interventions that were often inappropriate and ethnocentric in approach.

An Education Department was formed within the Bank for the first time during the 1970s which heightened the general awareness of education (Mundy, 2002). In 1971, the Bank broadened their policy on educational investments from vocational education to include efficiency and economic growth as key educational issues (Bujazan, Hare, La Belle et al., 1987). The *Education Sector Working Paper* (ES71) was the first public statement on the Bank's lending to education and defined the Bank's role in education, thus it gained much attention and circulation by those within the Bank as well as by its critics (Jones, 1997). The ES71 stated that projects should be emphasised which:

> like vocational training, produce trained manpower directly, but we should also consider financing other types of projects which should have important long-term significance for economic development. Such projects would be designed to encourage changes which improve the relevance, efficiency and economy of education systems. (World Bank, 1971 p. 14)

The role of educational technologies was made explicit for the first time in the ES71, and the use of educational radio and television was listed as one of four policies and operations for educational development in the 1970s (World Bank, 1971). For example, the ES71 stated:

> Prudently used as an integral part of the education system, these media [educational radio and television] can be highly effective in the introduction of new curricula, in upgrading of teachers and in the most efficient use of the best teachers for the mass of students. (World Bank, 1971 p. 20)

The report warned of a "serious danger" associated with educational technologies in viewing "these media as easy short cuts to educational development" (World Bank,

1971 p. 21). However, the report concluded by outlining a plan for "important new areas of research" which included the "cost/effectiveness of alternative learning technologies" (World Bank, 1971 p. 26). Thus, the means of improving education, and hence the development of 'manpower', was firmly fixed within the use of educational technologies.

While the ES71 was essentially a summary of the Bank's lending policies, the 1974 *Education Sector Working Paper* (ES74) demonstrated a more explicit interest in equality of educational opportunity and the education of poor and marginalised groups. Greater interest was directed towards the merits of investing in non-formal, distance and adult education (Mundy, 2002). This interest saw the development of education courses mediated through interactive radio and television (Grace and Kenny, 2003).

Endorsed by McNamara, the ES74 affirmed the Bank's commitment to educational technologies (World Bank, 1974 p. 41). The ES74 stated that, "There are cases where mass media, particularly radio, are used effectively in support of basic education programs" (World Bank, 1974 p. 31). The ES74 suggested that methods of teaching and learning could be improved by using technologies, but recognized that changes to existing teaching practice would be required:

> Preparing teachers to perform a new role in a changing educational technology is of crucial importance. Teachers are now expected to accept educational broadcasting not merely as a substitute for the blackboard, but as a vehicle to introduce improved curricula and new subject matter into the classroom. (World Bank, 1974 p. 40)

The high level of optimism surrounding the use of educational technologies was developed further in the 1980 *Education Sector Policy Paper* (ES80). The ES80 was a

highly influential document and heralded by Bank economist George Psacharopoulos (1981) as "a modern Bible on educational development" (p. 141). Psacharopoulos (1981) described the ES80 as "more academic" than the ES74, and Jones (1997) believed that it demonstrated "milder policy rhetoric" than previous educational policy statements (Jones, 1997). According to Jones (1997) it reflected "a textbook-style discussion of education and development, rather than being an explicit statement either of Bank lending criteria or its views on how governments should behave in the education sector" (p. 121).

The ES80 emphasised the role of technology in relation to educational progress and efficiency, arguing that, "If radio projects are properly designed and supported, they can have a high potential for improving efficiency" (World Bank, 1980 p. 36). It was believed that mass media, such as the radio and television, had the potential to fulfil three key objectives in education:

> First, educational broadcasting improves educational efficiency by improving the quality of instruction in traditional subjects, by providing instruction in subjects for which qualified teachers are not available, by supplementing curriculum reform, and by reducing repetition among slow learners. . . Second, mass media, usually in combination with printed materials, can provide distance learning to persons unable to attend classes. . . Third, the use of mass media can reduce education costs, if the number of users reaches a given minimum level. (World Bank, 1980 p. 35-36)

According to the ES80, the future of education was linked to the development and promotion of educational technologies. For example, "Further development of the technology of communication satellites and sources of power for receivers will undoubtedly increase the potential of television as an educational tool" (World Bank, 1980 p. 37).

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The analysis presented here illustrates the Bank's rationale for education lending, reflecting a strong commitment to economic rationalism and educational efficiency as primary means to development (Mundy, 2002). As we have seen, the use of educational technologies was positioned within these overall goals. It is noteworthy that the social, cultural and pedagogical conditions that influence the success of such interventions did not inform the overall character and strategies of the Bank's policies (McLean, 1981).

Education Policies from the 1990s

Education received more attention by the World Bank in the late 1980s and 1990s than during the previous decades. The Bank's investment in human development operations (health, education and nutrition) expanded from 7 percent to nearly 15 percent during the 1990s, representing one of the largest increases in the Bank's lending since its establishment (Mundy, 2002).

Three statements concerning education were published by the Bank during the 1990s: the 1995 *Priorities and Strategies for Education* (PS95), the 1999 *Education Sector Strategy Report* (ES99) and the 2005 *Education Sector Strategy Update* (ESSU). The PS95 described, in general terms, the conditions of successful educational development rather than the educational processes themselves (Jones, 1997; Mundy, 2002). By contrast, the ES99 identified specific priorities and directions in the education sector through cross-country and cross-regional analysis (World Bank, 2002c). Publication of the ES99 marked the culmination of two decades of rapid change in the Bank's lending programs in education. Moreover, the ES99 highlighted greater selectivity in the Bank's lending, which tended to focus on those countries where economic and political

reforms were already in progress (Mundy, 2002). The ESSU augmented the policies laid out in the ES99, offering guidance and directions that aimed to help staff and managers better respond to changes in the internal and external environment (World Bank, 2005).

All three documents emphasise the role of technology-mediated education as part of broader development strategies. For example, the ES99 stated:

> New technologies, especially the Internet, offer policymakers additional alternatives for delivering education and training to learners of all ages. These technological possibilities can reduce costs, increase access, and expand the range and quality of education and training options. (World Bank, 1999 p. 32)

Educational technologies are viewed as an important part of educational reform, particularly with respect to increasing access to education and improving existing pedagogies. It is thought that these benefits will enable societies to leapfrog toward faster growth and improved welfare (World Bank, 2005). To appreciate the importance of these claims, it is worth considering the context within which the policies were written. This background is briefly explained below.

Background to the Bank's policies: 1990 - 2005

The Bank's policies generated since the 1990s (principally, the PS95, ES99 and ESSU) were written during the aftermath of the collapse of socialism in the mid-1980s. Mikhail Gorbachev's twin political movements, *perestroika* and *glasnost* in the Soviet Union led to unprecedented change in world politics and international relations. *Perestroika* referred to economic reforms that emphasised reconstruction, and *glasnost* referred to political reforms that emphasised openness in, and democratisation of, the

Soviet political system (Walker, 1994). The fall of the Berlin Wall in 1989 marked the culmination of Gorbachev's campaign and the old Soviet system was effectively destroyed (Tabulawa, 2003). The end of the bipolar world signalled the end of socialism and ushered in a new world economy (Castells, 1993).

The collapse of socialism had profound implications for the World Bank. As Jones (1997) wrote, "Perhaps nothing has changed the World Bank – or at least its self-image – as much as the end of the Cold War and the entry of the Soviet bloc at the end of the 1980s and early 1990s" (p. 125). Similarly, Stiglitz (2001) pointed out that the end of socialism played a central role in shaping the views on development in many international aid agencies, including the World Bank. In this context, the promotion of *democratisation* and *globalisation* formed a central part of the World Bank's policies (Tabulawa, 2003).

As a political movement, the aim of democratisation was to increase the participation and interest of citizens in social and economic development (Walker, 1994). The World Bank expressed its preference for Western liberal democracy, arguing that political democratisation is an important indicator of development. As Tabulawa (2003) noted, "liberal democracy" is often regarded as a precursor to the promotion of "competitive capitalism" (p. 8). In the World Bank's view, education has a key role in promoting liberal democracy at a macro-level. This was described in the ES99:

> If all this democratisation is to survive and flourish, education will have a key contribution to make in helping citizenries develop the capabilities required to be well informed, understand difficult issues, make wise choices, and hold elected officials accountable for delivering on their promises. (World Bank, 1999 p. 1)

In the Bank's view, higher education has a particularly important role in promoting democratisation. As noted in the PS95, university education was described as one of six key reforms designed to support the development of democracy through 'comprehensive educational reform':

> Comprehensive educational reform will accelerate recovery, provide a long-term foundation for growth and support development of democratic political and social institutions. The benefits of an open economy and a participatory political system cannot be captured by individuals without market and citizenship skills. (World Bank, 1995 p. 142)

In addition to the heightened global awareness of democratisation, commentators have observed that the fall of the Berlin Wall contributed to an intensification of globalisation (Walker, 1994). Currie (2003) noted that the collapse of socialism marked the triumph of capitalism over communism and a strengthening of neoliberal globalisation. Similarly, Amutabi and Oketch (2003) explained that, "globalisation doctrines of extreme techno-economic determinism and socio-cultural domination by the United States have filled the intellectual and academic vacuum left by the disappearance of socialism" (p. 57). This trend is evident in the following World Bank statement:

> Global capital, moveable overnight from one part of the globe to another, is constantly seeking more favourable opportunities, including well-trained, productive, and attractively priced labour forces in market friendly and politically stable business environments. Employers, seeing local markets more exposed to global competition, are requiring production processes that are much faster, ensure higher quality outputs more reliably, accommodate greater variety and continuous innovation, and cut costs relentlessly, as wafer-thin profit margins drive win-or-die outcomes. (World Bank, 1999 p. 1)

The ES99 warned that failure to participate in the global economy by equipping populations through education may have severe consequences:

> [E]ducation will be centre stage: failure to recognise the importance of investing in human capital and equipping workers for the challenges ahead will handicap them severely. (World Bank, 1999 p. 1-2)

Jones (1997) argued that within the context of globalisation, the Bank assumed "an ideological stance . . . in promoting an integrated world economic system along market lines" (Jones, 1997 p. 126-127). Framed within economic principles, the Bank's agenda for global change is often viewed as driven by market-oriented economics, where countries are encouraged to adopt one particular model of economic, political and social policy. As Jones (1997) put it:

> With policy positions emerging with such explicitness, the Bank, which for so long had promoted an image of care in avoiding political prescriptions in favour of the technical, could no longer conceal its agenda. While nothing fundamental had changed, the fundamentals were now more visible. (Jones, 1997 p. 126)

In the new world order, the World Bank argued that education is of key importance, seen as a precursor to dynamic, knowledge-driven economies and cohesive societies (World Bank, 2005). Globalisation has important implications for education, particularly with respect to the skills and abilities required by the new society. As explained in the ES99:

> [P]ressures [of globalisation] are transforming the sorts of workers needed. Tomorrow's workers will need to be able to engage in lifelong education, learn new things quickly, perform more non-routine tasks and more complex problem solving, take more decisions, understand more about what they are working on, require less supervision, assume more responsibility, and – as vital tools to those ends – have better reading, quantitative, reasoning, and expository skills. (World Bank, 1999 p. 1)

In short, the heightened awareness of democratisation and globalisation ushered in by the collapse of socialism influenced the imperatives for education identified by the World Bank. These imperatives are expressed in the ES95:

These developments have created two key priorities for education: it must meet economies' growing demands for adaptable workers who can readily acquire new skills, and it must support the continued expansion of knowledge. (World Bank, 1995 p. 1)

Klees (2002) argued that the World Bank encourages countries to pursue democratic forms of education and train their citizens for a globalised world because otherwise they will not "catch up" but will "stagnate" (p. 454).

Education and democracy

Tabulawa (2003) argued that the nexus between education and the broader principle of democracy is student-centred pedagogy. The historical roots of student-centred pedagogy are derived from progressive methods of Western education, whose origins can be traced from a number of educational theorists and psychologists who opposed the uniformity and rigidity that typified education during the late nineteenth and early twentieth century (e.g. Rousseau, Pestalozzi, Froebel, Montessori, Dewey, and more recently, Piaget, Erickson, Bronfenbrenner and Bruner) (Laurillard, 1993). Student-centred learning is based on a constructivist epistemology and often used synonymously with descriptions of 'participatory', 'democratic', 'inquiry-based', 'discovery', 'lifelong' and 'constructivist' educational methods. These methods differ slightly, but all emphasise different degrees of learner autonomy (Jonassen, Howland, Moore and Marra, 2003; McInerney and McInerney, 2002).

Student-centred learning is derived from constructivist learning theory which states that meaning is constructed via social interaction by the individual. It rejects teacher-centred pedagogies (transmissive approaches to teaching, passive learning and rote-

memorisation) that have traditionally emphasised "correct" understanding of objective knowledge. Student-centred learning views students as active participants in constructing their own knowledge (McInerney and McInerney, 2002).

Student-centred approaches emphasise collaborative learning as a way to foster attitudes consistent with the values of democratic societies, such as individual autonomy, open-mindedness, tolerance for alternative viewpoints and co-operation in the learning process. Similarly, the role of the teacher, as a facilitator and guide of learning, is often regarded as a way to model democratic processes (Tabulawa, 2003). The World Bank values these attributes, claiming that student-centred education can improve overall learning outcomes and can foster more "democratic behaviours" than other pedagogical models (World Bank, 2003 p. 29).

The development of critical thinking and high level learning is considered to be an important component of student-centred learning. Critical thinking has been linked to the development of democratic values and behaviours. As Bailin and Siegal (2003) put it:

> To the extent that we value democracy, we must be committed to the fostering of the abilities and dispositions of critical thinking. Democracy can flourish just to the extent that its citizenry is able to reason well regarding political issues and matters of public policy, scrutinise the media, and generally meet the demands of democratic citizenship, many of which require the abilities and dispositions constitutive of critical thinking. (p. 189)

The World Bank is focused on helping client countries build the higher-level skills and knowledge needed to compete in global markets and foster economic growth (World Bank, 2005). The perceived need for high level learning and critical thinking was clearly stated in the ES99:

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> Tomorrow's workers will need to be able to engage in lifelong education, learn new things quickly, perform more non-routine tasks and more complex problem solving, take more decisions, understand more about what they are working on, require less supervision, assume more responsibility, and . . . have better reading, quantitative, reasoning and expository skills. (World Bank, 1999 p. 1)

The potential of technology to facilitate these pedagogical goals was described in the ESSU, which stated that the Bank intended to help "ensure that national policy for information and communications technology incorporates . . . sustainable, low-cost access to Internet needed to multiply learning opportunities and improve teaching quality (World Bank, 2005 p. 9).

Education and globalisation

The World Bank maintains that education must enable people to participate in and contribute to the global knowledge economy. The importance of this is stated in the ES99: "[I]n the hypercompetitive global market economy, knowledge is rapidly replacing raw materials and labour as the input most critical for survival and success" (World Bank, 1999 p. 2). Improving access to technology and technological know-how forms a central part of the Bank's goals. For example:

> The long-term goal for education . . . [is] to ensure that all people everywhere have the opportunity to . . . acquire essential skills to survive and thrive in a globalising economy. (World Bank, 1999 p. 6)

The basic concern is that those who have access to the raw materials for sustainable growth (which in the World Bank's view is access to, creation of and dissemination of information and knowledge) will be able to participate in the information age, whereas those who do not have access will not be able to develop in a globalising world. In

Fjortoft's (1999) words, "Those who have much will get more, much more, and those who have little will get less, or nothing" (p. 402). The Bank argued that, without opportunity for knowledge creation, countries, "risk falling far behind . . . Without vigorous efforts, global and national gaps in education, opportunities and outcomes could widen much more" (World Bank, 1999 p. vi).

Some scholars have noted the influence of the knowledge economy on shaping educational policy. Flew (2002), for example, described the knowledge economy as one of the main trends driving changes in education. Similarly, Lauzon (1999) argued that economic globalisation has radically influenced education and, in particular, the role of technology in education. Lax (2001) also noted that global influences have necessitated changes in educational systems to foster the development of flexibility, re-skilling and transferable skills.

One example of the Bank's efforts to promote access to knowledge in developing countries is the "Education Knowledge Management System" (EKMS). Drawing from the experience of large corporations in the U.S., the EKMS consists of information dissemination and links to external websites that aims to "improve the effectiveness of education sector staff through providing information and building knowledge" (World Bank, 1999 p. 42). The general aim of the EKMS is to be "a clearing-house for best practice knowledge" (Klees, 2002 p. 459).

The EKMS is based on the premise that rich (Western) people have knowledge and poor (non-Western) people have little knowledge that is relevant to the globalising world (Van der Velden, 2002). Based on this view, development strategies have effectively

focused on the transfer of knowledge from where it is available (i.e. in Western countries) to where it is needed in developing countries. Knowledge is assumed to be a neutral, manageable commodity that can be shared freely and easily, and that ICTs can provide the appropriate tools for accessing and communicating information and knowledge (Heyneman, 2003). In practical terms, the EKMS website is dominated by research done by the Bank, which as Klees (2002) put it, "continues to perpetuate the one-way flow of knowledge from North to South" (p. 459).

Insights from a Historical Perspective

The preceding analysis represents a selection of the measures and proposals introduced by the Bank to give some insight into some of the key elements of their approach to education. As we have seen, the World Bank has been influenced by powerful ideological agendas, evident in their interest in economic rationalism and manpower development, and more recently in the ideologies of democratisation and globalisation. Student-centred learning is promoted as the Bank's preferred pedagogical approach; in short, a 'one-size-fits-all' approach that ostensibly suits all education systems regardless of their cultural context. Technology has played a central role in the Bank's education policies since the early 1960s. These historical trends help illuminate the Bank's current focus on innovative delivery as expressed in the ES99 and in the following section, these insights are discussed with specific reference to innovative delivery.

Narrow economic focus

As we have seen, the Bank has approached education and development from one perspective only, which is an economic one (Klees, 2002). The Bank has acted on the assumption that all countries require the same development solutions by providing the same globalised solutions (Kempner and Jurema, 2002). Despite criticisms over this prescriptive approach, the Bank has nevertheless maintained an economics-driven approach to development. Stiglitz (2001), for instance, argued that, "Strategies of the past, even when they have been assiduously followed, have not guaranteed success. Furthermore, many of the most successful countries (representing the largest part of growth within the low income countries) have not actually followed the "recommended" strategies, but have carved out paths of their own" (p. 59).

Given the Bank's preoccupation with economic ambitions, the inclusion of innovative delivery in the ES99 might well be based on similar economic rationalist goals, where technology is seen as a way to promote the skills relevant in the knowledge-economy. Many scholars have criticized the economic rationalization of education and in Samoff's (1996) view, this approach omits consideration of the process of teaching and learning. When education is defined solely by its ability to prepare workers to adapt to and support the expansion of knowledge, a larger set of societal objectives for education can be neglected.

Student-centred learning as a 'one-size-fits-all' pedagogical approach

The Bank's interest in student-centred learning came into focus after the collapse of socialism and was coupled with an explicit focus on democratisation. The promotion of

student-centred learning is couched in benign terms of improving learning outcomes and educational effectiveness. However, as we have seen, student-centred learning embodies ideological notions of democratisation and a world view intended to foster a preferred kind of people and society (Tabulawa, 2003). As a pedagogical approach, student-centred learning embodies philosophical and epistemological foundations that Sultana (2001) described as a "world ideology". Similarly, Guthrie (1990) argued that student-centred learning aims at fostering "affective, moral and philosophical values about desirable psycho-sociological traits for individuals and for society" (p. 222). This view was supported by Tabulawa (2003) who suggested that student-centred learning reflects the norms of a liberal sub-culture. Thus, student-centred learning is not value-neutral and the Bank's explicit preference for this approach embodies biases toward a Western world view.

Student-centred learning as a 'one-size-fits-all' pedagogical approach raises questions about the homogenisation of educational practice. Clearly, not all education systems around the world currently endorse student-centred learning. Yet, the Bank gives little regard for local knowledge or local educational practices and gives little attention to the possible consequences of altering existing practice (Ilon, 2002). It follows then that to base innovative delivery programs on student-centred learning without consideration of alternative approaches is thus universalistic and prescriptive. Regardless of the potential benefit of student-centred learning, online education based on individualistic learning may prove ineffective in countries whose face-to-face learning experience has traditionally been collaborative and hierarchical (Ziguras, 2001).

Technocratic policies

The historical analysis presented in this chapter shows that the World Bank has been recommending technocratic policies since the establishment of education loans in 1963. This is not to suggest that all of the Bank's education policies have been technocratic; rather, it is to point out that technocratic policies have been a strong theme within the Bank's policies for over thirty-years.

The promotion of innovative delivery as a global priority for education thus reflects what Lankshear (2003) described as the "techno-rationalist business world-view". In this, the term "techno" refers to "privileging technicist approaches to realising social purposes", and the term "rationalist" refers to the "currently pervasive tendency to analyse and measure institutional processes and provisions in cost-benefit terms, with a view to 'rationalising' them accordingly" (Lankshear as quoted by Ferneding, 2003 p. 51).

The Bank's rationalist approach to innovative delivery also reflects what Neil Postman (1992) described in terms of "winners" and "losers". In Postman's (1992) view, the 'winners' are those who perceive their lives as more efficient, organised and productive as a result of the technology. The 'winners' encourage the 'losers' to be enthusiastic about computer technology, regardless of its relative importance to them. The 'losers' are those who are sceptical about the technology, or those for whom the technology has only marginal relevance. Postman (1992) argued that eventually "the losers succumb, in part because they believe . . . that the specialised knowledge of the masters of a new technology is a form of wisdom" (p. 11). Although the technologies developed in the North often have little relevance for the specific basic needs of those in developing

countries, poorer countries are nevertheless perceived as technological 'losers' until they adopt the practices and approaches of the technological 'winners'. The powerful influence of the North in the development of ICTs has led authors Amutabi and Oketch (2003) to argue that many of the Bank's approaches are "proselytizing, especially with regard to ideologies like democracy and technology like the Internet" (p. 58). Thus, a complex set of assumptions are embedded in the Bank's promotion of innovative delivery, which form the basis of the investigation presented here.

Summary

The purpose of this chapter was to contextualise the Bank's statements on innovative delivery as expressed in the 1999 *Education Sector Strategy Report* by examining the Bank's major policy documents within an historical context. The analysis showed that historically the Bank has approached development from a narrow focus on economics, coupled with a functional and instrumental view of education. Student-centred learning is promoted as a 'one-size-fits-all' pedagogical approach and within this approach, the Bank places little emphasis on how local contexts may impact the global context or how local cultures and values might be challenged (Ilon, 2002). Although "bankers" and "pedagogues" tend to look at education in quite different ways (Lauglo, 1996 p. 231), it is nevertheless important for the success of any interventions that the potential impact of culture and pedagogy is considered.

Simply according innovative delivery status of one of four global priorities for education does not necessarily mean that existing pedagogical practices in different cultural contexts will adapt accordingly. Nor does it mean that innovative delivery will

have universal application or benefit for all educational or cultural contexts. Clearly, these issues must be addressed when assessing whether the use of technology facilitates genuine improvements to education or whether it compounds existing difficulties (Marx, 1987).

These issues form the basis for the exploratory study presented here. In the next chapter, I further investigate the World Bank's statements on innovative delivery by examining the claims embedded in the ES99 in relation to the theoretical framework that each assumption implies. In particular, I consider the literature on the role of culture in technology-mediated education.

Chapter Three

Innovative Delivery and the Role of Cultural Context

Introduction

The purpose of this chapter is to further investigate the World Bank's aims for innovative delivery by considering the three assumptions of interest in relation to the theory that each assumption implies. First, I consider the assumption that *technology is a necessary and positive component of higher education* by reviewing key philosophical theories on the nature of technology and its role in society. Next, I consider the assumption that *innovative delivery can contribute to overcoming existing barriers to education* by examining theories concerning on the adoption of technology and barriers to technological use. Finally, I discuss the assumption that *innovative delivery can facilitate student-centred learning* by examining theories on student-centred learning and online education. These theoretical frameworks are then used as a lens with which to view the role of cultural context in technology-mediated education.

The Nature of Technology and its Role in Education

According to the World Bank, technology is both a necessary and positive component of higher education (World Bank, 1999). Basic assumptions about technology, such as

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those stated by the World Bank, have elsewhere in the research literature been described in terms of two theories on technology: *instrumentalism* and *substantivism*. The basic difference between the theories is the philosophical debate concerning the role of human control over technology and the nature of technological progress in society. Theories of instrumentalism and substantivism have been used to explain the nature of technology and its role in society, and imply basic differences in attitudes to technology (O'Sullivan, 2000). These theories are briefly described below and then used as a framework within which to consider the World Bank's assumptions and the potential influence of cultural context on people's attitudes to technology.

The *instrumental* theory of technology is a widely accepted view of technology and refers to the assumption that technologies are simply tools that people use to achieve assigned purposes (Feenberg, 1991). Instrumentalism states that how people choose to use the technologies is more important than the particular tools themselves. Technology is regarded as socially and ethically 'neutral' because it can be used for either beneficial or detrimental purposes (Chandler, 1995). In this sense, technology is considered as neither 'good' nor 'bad' in and of itself, but a 'neutral servant' of human will and action (Feenberg, 1999).

Innovative delivery is seen by the Bank as instrumental and a means by which education systems can be developed and access to education widened. As explained in Chapter Two, technology is regarded as a tool that can be successfully applied to any social or cultural situation. Technology is seen as much like a hammer, a tool that can work equally well in any context; the transfer of the technological tool is only inhibited by cost and perhaps logistics (see for example, World Bank, 2005).

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Instrumentalism is believed to have stemmed from confidence in the Western liberal confidence in progress and efficiency, originating during the Enlightenment period when technology was perceived as part of a steady, cumulative and inevitable expansion of knowledge and power. New scientific knowledge and technological power were expected to make comprehensive improvements in all aspects of life (Marx, 1987). Technology is thus viewed as an unproblematic part of society (Kerr, 1996) and "more technology is always better" (O'Sullivan, 2000 p. 55). As Mowshowitz (1976) explained, instrumentalism is a world view, "built on the rationalistic presupposition that all human and social problems can be resolved by the application of technology" (p. 8).

Many scholars have criticised the theory of instrumentalism, arguing that it can lead to uncritical acceptance of the possible consequences of technology adoption (Ferneding, 2003). Criticism of instrumentalism has been elaborated into the theory of *substantivism*, primarily through the work of Jacques Ellul, Leo Marx and Martin Heidegger. The central argument put forward by these theorists is that technology does not simply serve human interests in a benign, neutral manner but has an active role in altering society and is therefore 'non-neutral' (Bimber, 2003). Ellul (1973), for instance, claimed that technology cannot be directly controlled by people, but that the technology itself shapes society. This does not imply that technology makes itself; people are involved in developing the technology, but they have little control over the impact that it has on society (Feenberg, 1999). According to substantivism, technological developments can be either positive or negative, but are unavoidable and technological 'progress' is inevitable (O'Sullivan, 2000).

Mowshowitz (1984) argued further that the neutrality thesis of instrumentalism is a "myth" that reinforces an uncritical and naïve approach to the technical, social and cultural consequences of computers in society. More recently, Postman (1992) claimed that technology contains intellectual, political, sensory, social and content biases which mean that technology cannot be neutral and value free. Don Ihde (1993) also suggested that technology unavoidably selects, amplifies and reduces aspects of experience. Similarly, Blacker and McKie (2003) explained the substantive position in terms of individual responsibility, arguing that it is not the individual's responsibility to decide whether or not to use computers; it is imperative for individuals to acquire technical knowledge and skills just to 'keep up'.

Blacker and McKie (2003) further subdivided the instrumental/substantive dichotomy into *pro-technology* and *anti-technology*. Instrumentalists can be described as "pro-technology" when they assume that individuals will use technologies in positive ways. Conversely, instrumentalists can be considered "anti-technology" when they assume that individuals will use technologies in negative and destructive ways (O'Sullivan, 2000). "Pro-technology" substantivists are positive about the ways in which technology shapes society, arguing that technological advances always lead to societal improvement, leading to greater efficiency and progress (Negroponte, 1995), whereas "anti-technology" substantivists argue that the technology itself degrades society, including educational and cultural aspects of society (see for example, Ellul, 1973).

As previously mentioned, theories of instrumentalism and substantivism provide a useful framework with which to consider the potential influence of cultural context on

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people's attitudes to technology. Some scholars have associated instrumentalism with North American and Western attitudes to technology. Segal (1996), for example, pointed out that although a wide variety of attitudes exist among North Americans about the nature, power, influence and value of technology, a clear majority of Americans have linked technology with progress. Marx (1987) noted that although in the last half-century an increasing number of North Americans have adopted a sceptical, even negative attitude toward technology, that there is a tendency for Western societies to view scientific and technological innovation as part of a steady and more or less linear step toward societal progress.

This view was supported by O'Sullivan (2000), who argued that U.S. culture has persistently embraced a utopian perspective toward technology (p. 54). Similarly, Kerr (1996) wrote:

> Americans, for a number of reasons, seem particularly susceptible to a set of related propositions: that technology is *good*, that it is *value-free*, that it *should* find application in many fields, disciplines and aspects of our lives. Perhaps most troubling is the assumption that, if technology makes it possible to do something, then that *should* be done. (p. 1, italics in original)

According to Segal (1996), attitudes relating to technology and progress have extended to many parts of the Western world. He wrote that, "A faith in the powers of technology . . . to ameliorate human life and solve basic problems of modern society has been one of the central features of Western, not simply American, culture" (p. 39). Similarly, Chandler (1995) noted that Western nations tended to view technology as imperative to the functioning of society, even if the actual invention was 'useless' and had little benefit for society.

While these commentaries illustrate Western attitudes to technology, it appears that few scholars have specifically commented on non-Western attitudes to technology. Marx (1987) provided a few insights, commenting that in his view, the Chinese appeared to retain a love affair with Western-style modernization – individualistic, entrepreneurial, or "capitalist," as well as scientific and technological" (para. 2). According to Marx (1987), the Chinese assumed that any technological change almost certainly would be for the better and that the advance of technology was the basis of social and economic progress.

These insights can be elaborated by the general literature on non-Western culture. Nisbett (2003), for example, argued that there are basic differences between Western and non-Western cultures in their beliefs about the extent to which the environment can be controlled (Nisbett, 2003). Westerners tend to believe that they can control their own behaviour and they enjoy being in situations in which they can exercise their own choice and personal preference. By contrast, non-Westerners tend to prefer to make decisions collectively and feel little desire to be in control of their own individual actions. Nisbett (2003) argued further that Westerners tend to view their future as moving continuously in a single direction, whereas non-Westerners might expect the future to not necessarily move in the same direction but undergo reversals of direction.

From this, it could be suggested that given the Western preference for individual control, Westerners may be more inclined to view technology as a tool they can control and use according to their own discretion. Westerners may also view technological developments as moving in a single, positive direction, such as in making our lives more convenient and effective (O'Sullivan, 2000). Conversely, non-Westerners may be

less inclined to believe that they can control technology for their own purposes and instead may try to simply adjust to the technology. Non-Westerners may not necessarily see technological developments as always heading in the direction of positive progress.

The Role of Technology in Overcoming Barriers to Education

 The World Bank presents innovative delivery as an important way to improve access to education in developing countries (World Bank, 1999). A recent World Bank publication stated that, "Distance education has a long and, under certain circumstances, successful history of providing education that is comparable to or better than that provided in traditional institutional settings in the same country" (World Bank, 2003 p. 47). This claim was further supported in another World Bank publication titled, *Constructing Knowledge Societies: New Challenges for Tertiary Education*, which stated:

> Appropriate, well-functioning information and communications technologies are of vital importance to tertiary education because they have the potential to . . . expand access and improve the quality of instruction and learning on all levels. (World Bank, 2002a p. 15)

Similarly, in *Priorities and Strategies for Education* (PS95) educational technologies were promoted as allowing education to "reach beyond the traditional limits of classrooms and schools" and facilitate a "new means of providing instruction and educational resources to underserved populations" (World Bank, 1995 p. 84-85).

According to the World Bank, innovative delivery lacks the traditional constraints of time and space and can therefore contribute to overcoming existing barriers to education,

such as outdated equipment and declining budgets, "that prevent increased access to higher education for a significant majority of students" (World Bank, 1999 p. 2). It is believed that innovative delivery can allow students to remain in their home countries while receiving an internationally recognised education. By using satellite and computer technology, it is hoped that high-quality interactive courses can be broadcast directly to places of work, thus saving travel time and avoiding interruption of employment (World Bank, 1995). As the World Bank put it, "Once the Internet is available to learners in all countries, learners will no longer be at the mercy of poorly qualified teachers. Students anywhere in the world . . . will be able to download course content" (World Bank, 2003 p. 41). The ESSU provided a slightly less optimistic view, stating that "factors such as demographics, history, and geography, as well as the fiscal, political, and institutional climate, will provide both opportunities and constraints as countries seek to improve educational opportunities" (p. 21). However, it is hoped that the flexibility facilitated by online learning might mean that geographical proximity no longer has a primary influence on the educational opportunities available. In particular, it is believed that economic and social resources can be retained within the student's home country while the student is studying (World Bank, 1995).

Many commentators argue that simply making the technology available does not necessarily mean that people will use the technology (see for example, Collis, 1999a; Joo, 1999). Everett Rogers (1995), for example, argued that cultural values directly affect the diffusion of an innovation and that cultures are both predisposed to change and resistant to technological innovation. He argued that although economic factors are clearly important, the diffusion of innovations is not simply a matter of economic advantage. It follows that if the technology is not used, any potential benefits of the

technology would not be realised. Thus, understanding the factors that influence the adoption of technologies may give insight into the extent to which online learning might improve access to education. In the next section, I discuss four possible constraints on the use of technology: technical facilities, technological knowledge and experience, language barriers, and socio-cultural factors.

Technical facilities

Clearly, the extent to which technologies can overcome barriers to education is directly influenced by the general availability of technical facilities. The Bank's optimistic view on the transferability of technology exists despite the work of scholars who suggest that the lack of technical facilities poses major problems in the adoption of technology. Amutabi and Oketch (2003), for instance, argued that many African universities lack basic information and communication facilities and have an "appalling" ratio of learners to computers and lab equipment. Amutabi and Oketch (2003) argued further that those who cannot afford basic technical facilities will be automatically excluded from any potential benefits (p. 61).

Although there has always been great stratification between the 'haves' and the 'have-nots' of society during the initial diffusion of new technologies, in the case of new ICTs, some authors are concerned that differences in the availability of technical facilities is "dramatically increasing the gap" between countries (Fjortoft, 1999 p. 402). Relatedly, there is evidence to suggest that, in comparison to traditional methods of instruction, internet-based instruction is not cost-effective because of the substantial start-up investment required (Freeman and Capper, 1999) and may only be cost-effective under

certain circumstances that may not be realised at all institutions (Harley, Henke, Lawrence, McMartin, Maher, Gawlik and Muller, 2003).

The World Bank acknowledges the high cost of technological infrastructure, computer maintenance, training and technical support required in innovative delivery (World Bank, 2002a). However, without substantial financial investment, innovative delivery may only improve educational access for those who live in close proximity to institutions with adequate technical facilities and infrastructure.

Technological knowledge and experience

In addition to technical facilities, large sections of the population may be excluded from using new ICTs because of inadequate technical knowledge and experience (Chandrasekhar and Ghosh, 2001; Gladieux, 1999). As Gladiux (2000) put it, "Virtual space is infinite, but it does not promise universality or equity, nor is it appropriate for many students whose experience with technology is limited – and who might benefit far more from traditional delivery systems" (p. 353). In a study on Malaysian university students' use of technology, for example, Lee, Hong and Ling (2002) suggested that students' prior experience with technology directly influences their acceptance of ICT as a learning tool. Lee et al. (2002) argued that several factors were important in determining students' use of technology, including students' awareness of information available on the internet, access to the internet, age, perceived effectiveness and usefulness of ICTs (Lee et al., 2002). Thus, innovative delivery is unlikely to overcome existing barriers to education unless the appropriate technical knowledge and experience is made available to students.

Language barriers

As explained in Chapter 1, innovative delivery as conceptualised by the World Bank typically involves delivering educational products from Western nations to partnering institutions in non-Western nations. Because the courses and curricula are generally designed by European and U.S. universities, the resources often reflect Western pedagogy and content that may present problems for the recipient country. For example, the online lectures recorded by U.S. and British educators may reflect accents that are foreign to students in the recipient university (Amutabi and Oketch, 2003). Moreover, the educational materials are often delivered in English, which may be a foreign language for some students. Briguglio (2000), for example, argued that while the status of English as a "world language" may make it desirable for students' to earn a higher degree in English, students may experience many linguistic difficulties when learning in their second or third language. Briguglio (2000) suggested that when students from a non-English-speaking background are studying in a language that is not their first language, they should actively seek and obtain English-language support. This may be necessary even if some English language is used in their education.

Socio-cultural factors

Socio-cultural factors may also play a role in the extent to which innovative delivery can improve access to education. Mowshowitz (1984), for example, referred to these factors as "techno-cultural paradigms", which he described as cultural values and orientations that influence the way in which individuals and groups perceive the development of computer applications. In a similar vein, Chen et al. (1999) wrote that the cultural assumptions of beliefs about education, the values of the society, the

policies of the government, role of individuals and groups in society may impact on people's receptivity to technology. Furthermore, Marshallsay (1997) pointed out that, "While recognizing that unlike other commodities, education is not culturally neutral, it exposes basic elements of a particular culture" (p. viii).

Sofield (2000) examined the socio-cultural factors that influence the adoption of technology in Kiribati. Sofield (2000) argued that technologies are value-laden with Western ideals that run counter to the society's preference for a paternal form of government, a central control over the media and an emphasis on community rather than the individual. Sofield (2000) acknowledged the major deficiencies in infrastructure in Kiribati, but argued further that:

> [I]t would be a false assumption to conclude that simply solving problems of electricity supply and inadequate telecommunications facilities would usher in an electronically wired Kiribati able to communicate both internally and externally at the tap of a computer keyboard. (p. 25)

Sofield (2000) concluded that there are "deeply entrenched culturally bound values" which are far more significant in determining the adoption of technology in Kiribati than simply solving infrastructure problems (p. 25).

Another example of the influence of socio-cultural factors is seen in Brazil's approach to computer-mediated distance education. Brazil's Ministry of Education has discouraged both public and private attempts to invest in new technology-mediated learning methods. Litto (2002) explained that this reluctance may exist because of the Brazilian policymaker's belief in the central role of face-to-face teaching and learning. Litto (2002) believed that the emphasis placed on traditional, face-to-face methods may be attributed to "deep-seated scepticism within the culture, or due to hidden agendas on

the part of those in power, those social advances [in distance education] are still ignored" (para 32).

Learning Theory and Technology-Mediated Education

Improving the quality of education systems in developing countries is a key objective in the Bank's policies. The Bank stated that, "There is little point in expanding access unless there is reasonable quality. . . Quality is the key to achieving the imperative for the new millennium" (World Bank, 2002c p. 431). In the Bank's view, a "quality" education is *student-centred*, an approach to learning that is based on constructive learning theory. As explained in Chapter 2, student-centred learning emphasises skills and competencies such as knowledge construction, critical thinking, problem solving and higher level cognitive skills (McInerney and McInerney, 2002). Student-centred learning is the Bank's preferred pedagogical approach, and it is considered so important that if educators in developing countries have not already adopted this approach, the Bank suggests that they may need a "fundamental transformation of learning" from a teacher-centred to a student-centred approach to education (World Bank, 2003 p. xxiv). The Bank argued that, "Since active learning is generally superior to learning by rote, countries that move strongly toward more participatory and individualized modes of learning will be at an advantage relative to those where teachers talk and write and students listen and read" (World Bank, 1999 p. 8). In relation to higher education, the Bank commented on the importance of moving away from rote learning:

> These passive approaches to teaching have little value in a world where creativity and flexibility are at a premium. A more enlightened view of learning is urgently needed, emphasizing active intellectual engagement, participation, and discovery, rather than the passive absorption of facts. (World Bank, 2002 p. 23)

According to the World Bank, innovative delivery can help foster student-centred learning. For example, the ES99 states that, "technological innovation . . . will provide unprecedented opportunities to change education itself. New ways to expand access and improve quality – and fundamentally rethink what should be learned and how – will become widely available" (World Bank, 1999 p. 2). The potential of technology to improve teaching and learning was also explained in the ES95, which claimed that, "Computers improve student achievement and attitudes at all levels" (World Bank, 1995 p. 84). This optimism is also extended to the role of technology in university education: "At the tertiary level technology can substitute, at least partially, for teachers" (World Bank, 1995 p. 85).

Currie (2003a) suggested that if new technologies promote intellectual autonomy through direct access to freely available sources of information, then their development may be seen as a liberating force. The Bank's pedagogical aims for innovative delivery coincide with the views of scholars who argued that innovative delivery can *only* be effective when a student-centred approach is used. Gunawardena (2004), for example, argued that, "Importing traditional models of pedagogy to the online context will not work. This is a premise that must be kept at the forefront of any effort to develop online distance education programs" (p. 143). Similarly, Duffy and Jonassen (1992) stated that, "The information age and the technology capabilities have caused us to reconceptualize the learning process and to design new instructional approaches. Both the learning theories and the instructional approaches are consistent with the constructivist epistemology" (p. ix).

However, in practice, student-centred learning is often only realized by the expert few (Biggs, 1996). Moreover, difficulties in implementing a student-centred approach online may be compounded in education systems that do not use this approach in face-to-face learning. Indeed, cultural context has been identified as an essential component of effective student-centred learning (Chen, et al., 1999). Jonassen (1995) commented on the role of cultural context in student-centred learning:

> Constructivism is concerned with the process of how we construct knowledge. How we construct knowledge depends upon what learners already know, which depends on the kinds of experience they have had, how the learners have organized those experiences into knowledge structures and the learners' beliefs that are invoked when interpreting the events in the world. (p. 42)

There is an emerging body of literature on the role of cultural contexts on the acceptance, use and impact of computer-related interventions (Collis, 1999a). McLoughlin (1999), for example, stated that many factors may have an impact on the success of online learning environments, such as learner values, student perceptions of the technology itself, as well as differences in communication styles. Joo (1999) argued that the online learning environment "does not eliminate cultural obstacles – in fact, in many cases it appears to add to them" (p. 250). Similarly, Martyn Wild (1999) suggested that cultural influences are likely to become more evident as technology-mediated learning becomes more prevalent. He wrote that:

> We presently have a situation where adverse cultural influences in the Web are present and are largely created unknowingly; and as a result, work to the detriment of large groups of culturally diverse learners who cannot identify with the instructional designs in Web-based systems of teaching and learning, originating as they do, in single cultural identities. (p. 198)

Peter Sy (2002) argued further that technology has the potential to foster neo-colonialism because it can undermine ethnicity and traditional identities, and can

fragment society along technological lines. Thus, cultural differences may not only compromise the potential effectiveness of student-centred learning, but may also contribute to ethnocentric approaches.

In the next section, I consider the possible cultural issues that may arise when a student-centred approach is used in online education. Drawing on the relevant learning theory and the literature on educational technologies, I discuss the potential influence of culture as it relates to three areas of online learning: the role of teachers and students; high level learning and critical thinking; and collaborative learning.

Role of teacher and student

A student-centred approach encourages students to participate in active learning, exploration and construction of knowledge, rather than passively receive information (Jonassen, et al., 2003). The role of a teacher has been described as one of 'facilitator' of learning rather than 'transmitter' of knowledge, and the role of the student has been described as one of 'independent learner' rather than 'passive recipient' (Cole, 2000). It is believed that this approach enables students to have greater responsibility and ownership over the learning process, which ultimately can contribute to more effective learning (Peters, 2000).

The World Bank supports these 'roles' for teachers and students, as explained in their recent publication, *Lifelong Learning in the Global Knowledge Economy: Challenges for Developing Countries* (World Bank, 2003). This document claimed that learning is most effective when, "Teachers and trainers serve as facilitators rather than transmitters

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of knowledge" (World Bank, 2003 p. 28). In the same report, the Bank argued further

that, "Traditional educational systems, in which the teacher is the sole source of

knowledge, are ill suited to equip people to work and live in a knowledge economy"

(World Bank, 2003 p. 28).

Some scholars have argued that the unique characteristics of educational technologies

can facilitate changes in the role of the teachers and students (see for example, Kapitzke,

2000; Spiro and Jehng, 1990; Tam, 2000; Vrasidas, 2002). Sheard and Lynch (2003),

for example, explained that:

> Web-based environments can facilitate a shift in focus from teacher-centred to
> learner-centred education, encouraging educators to provide courses which
> enable students to manage their own learning. Enabling the learners more
> control of their learning has become the central goal or a desirable side benefit
> of computer technology. (p. 2)

Authors in support of new technologies have suggested that educational technologies

can enable students to learn more flexibly, at their own pace and at their own time

(Cunningham, et al., 1998), while making education more efficient, effective and

affordable (Harley, 2001).   Other researchers identified flexibility in location, in

program, in types of interactions, in forms of communication and in study material.

Research based on European universities identified twenty dimensions of flexibility, all

of which imply a greater level of independent or self-regulated learning (Collis,

Vingerhoets and Moonen as quoted by Collis, 1999b).

Some commentators believe that technology-mediated education can enable students to

become more independent in their learning (see for example, Cole, 2000). Edwards and

Usher (2000) suggested that the online environment reconfigures the teacher-student

relationship, creating new learner controlled environments that can blur the distinction between teacher and student. Chen and Macredie (2002) and Lee et al., (2002) also argued that online resources require more independence and control over learning. As Jonassen, et al. (2003) put it:

> The internet is a tool with the potential to transform traditional teacher-directed instruction into powerful, student-led, inquiry-based learning. The internet expands opportunities for learning with a wide variety of resources and people providing multiple perspectives, access to diverse cultures, access to experts and access to information. (p. 39)

Commenting on Malaysian education, Halim (1997) suggested that the role of the teachers and students could be changed through "new media" and "innovative delivery mechanisms" (p. 145). Halim (1997) rejected the current prescriptive teacher-oriented framework that he believed typified Malaysian university education and argued that educational technologies could be used to facilitate the desired student-centred approach to learning. Other studies have provided support for the notion that constructivist approaches not only enhances students' attitudes towards technology, but also enables students to be active participants in their own learning process (Luan, Jalil, Ayub, Baker, and Hong, 2003).

The World Bank's view coincides with those in support of new technologies, arguing that, "With proper integration of technology in the curriculum, teachers can move away from their customary role as one-way instructors toward becoming facilitators of learning" (World Bank, 2002a p. 40). These aims were explained in *Lifelong Learning in the Global Knowledge Economy: Challenges for Developing Countries*:

> Where the internet is available to learners on a reliable and affordable basis, the teacher is no longer the sole authority in the classroom. The Internet changes the

hierarchical relationship between teacher and learner, with learners able to explore new territory, guided by the teacher. (World Bank, 2003 p. 40)

However, encouraging teachers to be facilitators of learning in an online environment can be difficult (Dastbaz and Kalafatis, 2003). As Flew (2002) pointed out, teachers may use educational technologies to simply replicate the "shovelware" model of teaching and learning (Flew, 2002, p. 54). Similarly, Jonassen et al. (2003) argued that educational technologies may be "no more than an electronic worksheet if the old prescriptive model of learning is transferred to the new medium" (p. 39).

Learner control, for instance, has been identified as a central difficulty in students' use of technology (Chen and Macredie, 2002). The online learning environment does not present one linear path, but many links through which students can explore a subject at their own pace. On the one hand, this may free up the way in which information is delivered, giving students greater control over what they read and the order in which they read it. On the other hand, not all students have the same capacity or willingness to independently negotiate the non-linear navigation paths (Chen and Macredie, 2002). The independence required by the nonlinear learning environment may conflict with students' past educational experiences and may require a shift in their conception of what constitutes teaching and learning (Joo, 1999; Tam, 2000).

Altering the roles of teachers and students in an online learning environment may present further difficulties for those in countries whose face-to-face educational practice is not student-centred. The World Bank also acknowledged these challenges:

> In the old model of learning, teachers told learners what they needed to know. In the new learning environment, teachers and trainers work as facilitators, enabling learners to access knowledge and develop their conceptual

> understanding. Creating this new environment requires a change of culture, especially where teachers' status in the classroom and society arises from being perceived as an authority figure. (World Bank, 2003 p. 34)

In many South East Asian educational traditions, for example, the teachers' role is typically an authority-figure who transmits knowledge to students. Commentators have suggested that even in the 1990s many South East Asian students continue to be influenced by the Confucian tradition of hierarchical student/teacher relationships. In this system, students are "below" teachers and teachers are responsible for imparting knowledge to the students. Students tend not to question the authority of the teachers' knowledge (Pratt and Wong, 1999). South East Asian learners emphasise group achievement, respect for authority and reverence for existing knowledge. Western learners, by contrast, are more familiar with Socratic teaching and learning methods, and are encouraged to challenge existing beliefs and test the validity of knowledge systems.

These practices and tendencies observed in face-to-face South East Asian education may make it difficult for student-centred learning to occur in an online learning environment. Ziguras (2001), for example, noted that the use of new technologies "may not be as appropriate in South East Asian countries as it is in more individualistic educational exporting countries" (p. 8). Guthrie (1990) also pointed out that, "Educationalists in societies which place great value on respect for elders, on respect for wisdom and knowledge, and on respect for religion, need to be consciously aware of the potential for conflict over curriculum innovations based on different values" (p. 223). Similarly, Smith (2001) showed that in a sample of three Chinese groups (Singapore, Malaysia and Hong Kong), students preferred highly organised and well-structured

learning programmes and were inclined to confine their learning to the prescribed readings and to teacher instructions and directions (Smith, 2001). Joo (1999) suggested that because the Internet promotes pro-active teaching and learning, it may affect the balance of power in countries where the educational system is centralised and authoritarian. Joo (1999) argued further that "not all national educational systems are well prepared to face the paradigm shift invoked in these roles" (p. 247).

High level learning and critical thinking

High level learning and critical thinking is viewed as a central part of student-centred learning. Critical thinking has been defined as "involving the ability to explore a problem, question, or situation; integrate all the available information about it; arrive at a solution or hypothesis; and justify one's position" (Warnick and Inch as quoted by Petress, 2004 p. 461). High level learning refers to advanced or complex thinking in contrast to simpler, less sophisticated forms of thinking (Bailin and Siegal, 2003).

The literature on educational technologies is replete with examples of the potential of technology-mediated education to facilitate critical thinking. Ellis (2001), for example, maintained that educational technologies lend themselves to deeper learning and critical thinking when used as an adjunct to existing educational process. Other writers have suggested that because educational technologies present information in a variety of forms and perspectives, students can revisit the same content material many times, with each visit having the potential to bring out additional aspects of the content (Spiro and Jehng, 1990).

Other authors were more reserved in their enthusiasm, arguing that, in and of itself, the computer does not promote inquiry learning, rather critical thinking can only take place if the teacher uses a constructivist approach to teaching (Maor and Taylor, 1995). One reason why a constructivist approach is often difficult to achieve is because computers were first introduced as tools to facilitate the drill and practice associated with rote learning (Jonassen, 2003). In practice, computers are still perceived as (and used) primarily as a tool for gaining information, rather than for high level learning and critical thinking.

Collaborative learning

Another key aspect of student-centred learning is its emphasis on collaborative learning. Scholars have described collaborative learning as the construction of shared understanding through interaction and problem solving with others (Crook, 1994). Collaborative or group learning refers to instructional methods that encourage students to work together. Instruction is learner-centred because students take an active role in constructing knowledge together with their peers (Keynes, Hiltz and Benbunan-Fich, 1997). Dialogue, reflection and negotiation of meaning are important activities in collaborative learning. Students are expected to obtain an answer to a problem, but also explain and justify their developing ideas to others. As students construct knowledge in groups, the role of the teacher is to support student interaction by promoting recognition, evaluation and reconstruction of ideas (Maor, 2004). The benefits of this approach for student learning have been well documented, with positive effects noted in areas such as student achievement, problem solving and motivation (see for example Crook, 1994).

Some authors postulate that online learning can encourage students to engage in collaborative learning (Hendriks and Maor, 2004). It is believed that the online learning environment can enable students to take an active part, along with their peers and facilitators, in building up their own knowledge via a technology-based on interactive networking. Oliver and Omari (1999), for instance, argued that group work and exchange of ideas can be enhanced in technology-mediated learning. Similarly, Brown (2002) suggested that online technologies can facilitate student-to-student interaction and feedback from teachers. Peters (2000) also argued that students can interact with their tutors more easily and more often, individually or in groups both asynchronously and synchronously. Moreover, Crook (1994) maintained that e-learning can provide students with opportunities for collaborative learning and involvement in the construction and interpretation of knowledge. Tsai (2001) commented on the future of constructivist instructional principles for internet-based science instruction in Taiwan and argued that the internet provides a broader context for students' collaborative learning than can be achieved by traditional teaching.

Looi (2002) noted that discussion forums can provide a venue of discussion for quiet students and accommodate different learning styles. The World Bank expressed similar views in support of educational technologies and collaborative learning. For example, "Computer technologies are powerful means of connecting learning to real-world contexts. Through e-mail and the Internet, learners and teachers can communicate with each other and work on joint projects" (World Bank, 2003 p. 40).

In face-to-face education, however, collaborative learning involves more than simply putting students in groups. Effective peer learning is dependent on the task and the

creation of group goals and group organisation, where the students are dependent on each other to solve problems (Arvaja, Eteläpelto, Häkkinen, and Rasku-Puttonen, 2003). It follows that collaborative learning online is not simply a case of including a discussion board on a unit website, but must involve opportunities for meaningful online discussions facilitated by a teacher or lecturer (Hendriks and Maor, 2004). Moreover, students need to be given a task that requires problem solving and high level interaction (Arvaja, et al., 2003).

Summary

This chapter examined a selection of the relevant literature concerning the three assumptions of interest put forward by the World Bank in the ES99. Attitudes to technology will obviously vary within and between cultures; however, the literature presented in this chapter points to some basic differences in attitudes to technology that stem from culturally defined ways of viewing the world. Furthermore, although technological infrastructure and connectivity are important factors in the diffusion of technology, socio-cultural factors also directly influence the extent to which technologies are used. Solving infrastructure problems may only serve to address one of many factors that influence the adoption of technology. Finally, student-centred learning endorses the facilitation of learning and active participation by students. However, given the nature of an online environment, this approach to learning may be difficult to achieve in practice.

Thus, it remains to be established whether the World Bank's aims for innovative delivery will be realised in culturally diverse educational systems. The present study

was developed to investigate the socio-cultural and pedagogical issues that may arise when the World Bank's assumptions are put into practice in different cultural contexts. This was achieved by comparing the assumptions put forward in the ES99 with the reported perceptions of, attitudes toward and use of ICTs by students and lecturers from three different cultural contexts. To achieve this comparison, detailed, empirical data were required to reveal differences and commonalities between the Bank's aims and students and their lecturers in Australia, Malaysia and the United States. The methodology developed to achieve this purpose is described in the next chapter.

Chapter Four

Methodology

Introduction

The purpose of this thesis was to interrogate the World Bank's technocratic vision of innovative delivery for higher education. To this end, I compared the assumptions put forward in the ES99 with the reported perceptions of, attitudes toward and use of ICT's by students and lecturers from Australia, Malaysia and the United States. More specifically, this thesis aimed to better understand how students from diverse cultural contexts perceive online technologies, the factors that influence their use, and how they use online technologies in their learning.

From these general goals, this thesis aimed to address four specific research questions, as described in Chapter 1.

1. What are students' attitudes to the nature of technology and its role in higher education?

2. To what extent can innovative delivery overcome existing barriers to education?

3. To what extent are students' attitudes to and use of online resources consistent with the principles of student-centred learning?

4. What are the commonalities and differences between students' responses to questions 1, 2 and 3 (above) and the World Bank's policy on innovative delivery?

In this chapter, I describe the methodological approach, data collection and data analysis used to address the research questions listed above.

Methodological Approach

Savenye and Robinson (1996) argued that the choice of research method (or methods) should be driven by the questions that the researcher seeks to answer. For the present study, qualitative and quantitative methods were combined using a *mixed methods* approach because the author believed that a single quantitative or qualitative methodology would not adequately address the questiona targeted by this study. Using quantitative methodologies alone might fail to capture the richness and complexity of individuals' perceptions and values, which are of particular interest in research on attitudes and behaviour. In addition, using only qualitative methodologies might preclude analysis of relationships amongst a range of cultural, attitudinal and behavioural variables of interest.

As a research paradigm, mixed methods research has only recently become part of mainstream social science research and scholars do not agree on many of the fundamental issues related to the field (Teddlie and Tashakkori, 2003). There is some controversy over the basic definition of mixed methods; however, as Creswell (2003) pointed out, it is generally agreed that:

> A mixed methods approach is one in which the research tends to base knowledge claims on pragmatic grounds . . . It employs strategies of inquiry that involve collecting data either simultaneously or sequentially to best understand research problems. The data collection also involves gathering both numeric information (e.g. on instruments) as well as text information (e.g. on interviews) so that the final database represents both quantitative and qualitative information. (p. 19-20)

Mixed methods emerged in response to the development of more sophisticated qualitative and quantitative methods in social science research (Creswell, 2003). The evolution of mixed methods was traced by Madey (1982) who argued that it emerged out of dissatisfaction with the single use of existing methods to address complex social problems. Maxcy (2003) explained further that mixed methods were ushered into mainstream research by contributions of pragmatists such as Peirce, Dewey and Bentley. Pragmatism rejected the rigidity of rationalism and allowed research to be undertaken without requiring strict adherence to the laws or rules that governed what is recognised as "true" or "valid".

Numerous authors have endorsed a mixed methods approach to research (see for example, Creswell, 2003; Madey, 1982; Takooshian, Mrinal and Mrinal, 2001; Teddlie and Tashakkori, 2003). Teddlie and Tashakkori (2003), for example, argued that mixed methods can answer questions that other methodologies may not achieve, offer stronger inferences and provide an opportunity for presenting a greater diversity on divergent views. Maxcy (2003) claimed that the value of mixed methods lies in its ability to open up the interpretative dimension of social science research and "lay bare the assumptions about the nature of reality, the human mind and the tools that investigators employ in research" (p. 86). Other authors have focused on the unique contribution that a mixed methods approach can offer. Brewer and Hunter (1989) explained:

> [T]he multimethod perspective holds out the larger promise of more sociologically significant conclusions and greater opportunities for both verification and discovery. Moreover, we believe that the approach promises to alleviate some of the persistent dilemmas and conflicts in social research. (p. 21)

Brewer and Hunter (1989) also suggested that a major strength of mixed methods is the opportunity to collect data from many different sources. They argued that, "The strongest confirmation of a theory comes . . . from research that studies numerous and varied hypotheses and employs multiple measures of the theoretical concepts involved. The employment of multiple research methods adds to the strength of evidence" (p. 48).

Combining research methods is beneficial because as Savenye and Robinson (1996) pointed out, "forcing a choice between using qualitative and quantitative methods limits and inhibits the quality of research" (p. 1173). This observation was supported by Creswell (2003) who commented on the usefulness of mixed methods in converging and confirming findings from different data sources, as well as providing insights on different aspects of research problems. The proliferation of mixed methods research is evidenced by the fact that entire textbooks on procedures for conducting mixed methods now exist that were not available some decades ago (see for example, Teddlie and Tashakkori, 2003).

One disadvantage of mixed methods is that it can complicate the process of interpreting the findings. Different types of research methods can sometimes provide conflicting answers to questions and can make problems appear to be more complex (or complex in different ways) than they really are. Extra time and resources may be needed to successfully incorporate both quantitative and qualitative methodologies to answer a research problem (Robson, 2002). However, despite these potential limitations, the

benefits of mixed methods seemed an appropriate and fruitful approach to the study end-users' perceptions, attitudes toward and use of online resources.

A Note on the Measurement of Attitudes and Behaviour

There is a large body of literature on the measurement of attitudes and behaviour (see for example, Ajzen and Fishbein, 1980; Eagly and Chaiken, 1993). It is not my intention to provide a review of this literature but simply to point to the work of prominent authors Eagly and Chaiken (1993) who established that attitudes and behaviour are inextricably linked and that attitudes have the potential to predict behaviour. Eagly and Chaiken (1993) defined an attitude as "a psychological tendency that is expressed by evaluation of a particular entity with some degree of favour or disfavour" (p. 1). Attitudes are considered "latent traits" and it is the manifestation of these traits that can be measured indirectly, either through quantitative or qualitative methodologies.

In the next section, I discuss the context and design of the present study, giving particular attention to the qualitative measurement of attitudes and behaviours. The method for achieving quantitative measurement of attitudes and behaviour is described in detail in Chapter 5.

Context and Design of the Study

Table 4.1 below provides an overview of the methods used to assess students' attitudes to and use of online resources. The left-hand column lists the three assumptions that

underlie the views put forward by the World Bank. The middle column lists the

qualitative method used and lists the interview section that focused on each assumption,

although there was some overlap in each of the sections. The right-hand column lists

the eight scales used in the questionnaire to quantitatively measure students' attitudes

and behaviours. The complete list of interview questions used can be found in

Appendix II and the questionnaire can be found in Appendices III and IV.

Table 4.1 Overview of the mixed methods used in the present research.

	Method	
Assumptions promoted by the World Bank	Qualitative method	Quantitative method
Technology is a necessary and positive component in education	Attitudes to online resources (interview questions, section 3)	Not assessed quantitatively
Innovative delivery can overcome existing barriers to education	Use of online resources (interview questions, section 1)	Technical Factors (TF) Factors Affecting Use (FAU) Experience with Technology (ET)
Innovative delivery can facilitate student-centred learning	Attitudes to and use of online resources in teaching and learning (interview questions, section 1)	Motivation (MOT) Teaching and Learning (TL) Attitude to Online learning (ATT) Online Use (OU) Administrative Use (ADMIN)

Each component of this study was carefully selected for its qualities that would address

the research questions targeted in this study (Creswell, 2003). The criteria for the

selection of countries, universities, units of study and research instruments are briefly

described below.

Description of Selected Countries

To address the research questions listed above, three countries were selected as illustrations of different cultures using online learning. I sought Western and non-Western countries that would fulfil three criteria: countries with contrasting levels of economic and social levels; countries with contrasting levels of technological infrastructure and use of technology in education; and, countries with contrasting pedagogical approaches to teaching and learning.

One difficulty in choosing countries with the above contrasts is the high degree of variation within countries. For example, the Bay Area of San Francisco where the U.S. study was performed is exceedingly technologically advanced, being the home of Silicon Valley and the origin of many internet technologies (e.g. Google, Yahoo). Interestingly, despite these technological advancements in districts such as the Bay Area, the U.S. has an overall lower number of households with access to a home computer than Australia (61.8% verses 66%, respectively) (OECD, 2006). However, the number of households with access to the internet is slightly higher in the U.S. (54.6%) than in Australia (53%) (OECD, 2006).

Given these differences within countries, it becomes difficult to find data to compare individual cities, as opposed to countries. Although quantitative comparisons may be difficult between Perth (where the Australian study was performed) and the Bay Area, the author's subjective experience from living and working in both cities is that Perth has less technological infrastructure and economic development than the Bay Area. Even within cities there is variation and students who have been accepted into one of

the best public universities in the U.S. may have more technological literacy than those entering institutions of less prestige and competition in Australia and Malaysia.

With such variation and the aims of comparing 'cultures' the present research has had to rely somewhat on familiarity with the educational, cultural and technological profiles of the institutions being used in the study. Existing ties with the Malaysian institutions and the experience of living, working and studying in the U.S. and Australian institutions has provided the author with familiarity with some of the more obvious 'contrasts' between the countries/institutions. These served as a starting point to reveal more information on these contrasts through quantitative and qualitative research. As Brislin, Lonner and Thorndike (1973) remind us, familiarity with and accessibility to the cultures in questions is a necessary starting point for cross-cultural research. Below are some general observations about the three countries selected for study.

Australia and the U.S. are high-income industrialised nations with a high standard of living. Data provided by the U.S. Central Intelligence Agency (CIA) described both nations as having a mid to high Gross Domestic Product (GDP) per capita; at 2005 it was estimated that Australia's GDP was $31,600 and the U.S.'s GDP was $41,600. Malaysia's GDP was considerably lower at $12,000 (CIA, 2006).

The CIA (2006) described the U.S. as having "the largest and most technologically powerful economy in the world," and Australia has an "enviable Western-style capitalist economy with a per capita GDP on par with the four dominant West European economies." By contrast, the CIA (2006) described Malaysia as a middle-income country that transformed itself from 1971 through the late 1990s from a producer of raw

materials into an emerging multi-sector economy. The Malaysian government has set ambitious goals for developing the Malaysian economy and society. A key focus has been the integration and promotion of ICTs, through programmes such as the "Vision2020" and the "Multimedia Super Corridor". These programmes aimed to achieve first-world status for Malaysia by the year 2020 (Taylor, 2003). These goals were also stated in the Eighth Malaysia Plan (2001): "ICT has a strategic role in accelerating the economic growth process by increasing the efficiency and productivity of all sectors in the economy" (p. 14). However, the overall proportion of population using the internet was lowest in Malaysia (45%) when compared to the U.S. (69%) and Australia (72%) (CIA, 2006).

With respect to pedagogy, 'Western' and 'Asian' approaches are informed by widely differing historical and cultural perspectives, from western to Confucian, and from colonial to postcolonial. It is therefore difficult to characterise approaches to teaching and learning. However, in general terms, Malaysian education can be described as influenced by the philosophy of Confucianism, which Reagan (2000) described as part of the Malaysian "psycho-cultural construct" (p. 105). Relationships between teachers and students tend to be hierarchical and the Malaysian educational system is expected to serve the needs of the economy rather than the needs of individuals. Education is seen as a way to teach individuals the "proper conduct" for participating in society, and thus tends to be 'teacher-centred' (Reagan, 2000). In response to the perceived need to participate in the knowledge-based economy, Malaysian education is currently undergoing a period of rapid change and development. In recent years, policy makers have attempted to change the hierarchical, teacher-centred approach to a more participatory, student-centred approach. The Eighth Malaysia Plan (2001), which

outlined the strategies, programs and projects designed to achieve sustainable growth for the nations' development, emphasised the need for education to foster critical thinking skills. The Plan stated, "The demand will be for high level skills as the economy moves towards higher capital-intensity and knowledge-based production process" (Eighth Malaysia Plan, 2001 p. 87).

University education in Australia and the U.S. has traditionally relied on lectures and textbooks, coupled with an emphasis on 'imparting knowledge'. In recent decades, this tradition has changed as teaching and learning styles have been increasingly influenced by the work of psychologists such as Vygotsky, Piaget and Bruner, all of whom argued for the active engagement of the learner rather than the passive reception of given knowledge (Laurillard, 1993). Interest in contextualised, student-centred learning first gained prominence in primary and secondary education, and it is now considered an important pedagogical approach in university education. The importance of this approach in higher education has been fuelled by the perceived relevance of student-centred learning in the development of the knowledge economy.

In contrast to the hierarchical and teacher-centred approach that ostensibly typifies Malaysian education, Western pedagogy is characterised by the promotion of critical thinking and independent learning. Ryan and Louie (2005) suggested that the teacher is regarded as a mentor or facilitator, who leads students towards 'discovering' learning while fostering critical thinking and reasoning. In Western higher education, group participation is preferred rather than more individual or passive classroom behaviours. These approaches are considered the ideals of Western pedagogical practice that many educators strive to achieve (Ryan and Louie, 2005).

These technological, economic and pedagogical differences between Australia, Malaysia and the U.S. outlined here set the scene for the present research.

Description of Universities

Australian university

A public research university in Western Australia, Perth, was chosen as the Australian research site (hereafter referred to as "University A"). In 2006, approximately 13,000 students were enrolled in University A, of which about 1,850 were overseas students from over 70 different countries. University A upholds a strong belief in equality and has a particular focus on maintaining cultural diversity. Since 1976, University A has offered face-to-face units internally and distance education units externally using tutors, hard copy materials and some audio tapes. In 1988, a few units were offered online, using WebCT[2] as the delivery vehicle. In 2006, online resources were used in many units, although the use of online resources was generally more prevalent in business and science programs than in the humanities.

Malaysian colleges

Two private higher education colleges located in Penang (PG) and Petaling Jaya (PJ) were chosen as the Malaysian research sites (collectively referred to as "University B"). Many programs offered at University B are conducted in association with foreign

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[2] WebCT is a web based tool that serves as a store of information related to a specific unit and is only accessible by lecturers and students associated with that unit via a password.

universities in twinning and offshore programs (Australian Vice-Chancellors' Committee, 2003).

University B has been partnering with the Australian university described above (University A) in a twinning arrangement since 1995 and therefore was accessible to the author by virtue of having established links with Australia. Online resources were incorporated as part of the twinning arrangement since 2000. However, technological infrastructure remains limited and thus the use of technologies in teaching and learning is not widespread across the Colleges.

The United States university

A large public research university located in the Bay Area in northern California was chosen as the U.S. research site (hereafter referred to as "University C"). In 2006, over 23,000 undergraduate students were enrolled in University C. A recent survey of higher education conducted by *The Economist* ranked University C as 4th among the world's top universities (*The Economist*, 2005).

In comparison to University A and University B, University C is the most advanced in its technological infrastructure and online resources are used extensively in university education. Research is being conducted on the use of technology in education as a way to meet an anticipated influx of new students over the next decade. The university aims to use technology to serve the educational needs of more students without increasing teaching and support staff (see for example Harley et al., 2003). The university-wide push for technological solutions to educational problems, coupled with the substantial

investment in technological infrastructure, has resulted in extensive use of online resources.

Ethnic diversity in the student population

It is important to note that much ethnic diversity exists within the student population at each university selected. For example, international students from Asian countries have a strong presence in Australian universities, which reflects "a major shift in the character of the student population, from one of primarily Anglo-Celtic English speaking origins, to one which also includes a large and increasing percentage of students who come from a non-English speaking background" (Phillips as quoted by Ramburuth and McCormick, 2001 p. 333-334). The student population at Malaysian universities is similarly diverse, enrolling students from countries such as India, China and Indonesia.

Given that the student populations are not homogenous, it is difficult to characterise and group students at each institution as either "Australian", "Malaysian" or "U.S" students. Once again, however, the author's subjective experience of the selected universities is that, on the whole, the student population at each institution are primarily characterised by Australian, Malaysian and U.S. students.

Description of the Units Selected

At each university selected in Australia, Malaysia and the U.S., students enrolled in large, undergraduate lecture-based units were invited to participate in the study.

Lecture-based units were chosen because this created an opportunity to observe students' interactions with the technology in a setting similar to the programs proposed by the World Bank. In Australia and Malaysia, the units selected were offered as second-year undergraduate units. In the U.S., the unit selected was offered as an undergraduate "breadth requirement" which meant that students were required to complete the unit within the duration of their degree, but not necessarily in their second year of study.

With respect to the specific websites and online technologies used at each university, these were selected based on their similarity to those in the programs proposed by the World Bank. Specifically, three types of online resources were investigated: communication tools (online discussion board and internal unit email); online lecture delivery tools (iLecture[3] and webcast[4]); and presentation tools (lecture PowerPoint slides). These online resources were offered as supplements to existing learning resources, once again because this most closely resembled the Bank's aims for innovative delivery. The units selected at each university had a similar set of characteristics and utilised a similar range of online technologies. These are briefly described below.

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[3] "iLecture" refers to a combination of in-class lectures with lecture presentation visuals (PowerPoint). The audio tracks can be played via software (e.g. RealPlayer) in conjunction with the PowerPoint slides to provide streamlined audio presentation over the Internet for on-demand replay. iLecture is accessed via WebCT links. PowerPoint presentations can be viewed along with the audio presentation and controlled by using the arrows to move from slide to slide. iLecture was used at the Australian university and Malaysian colleges.

[4] Webcast is similar to iLecture in that it combines audio recording of the in class lecture with the PowerPoint slides, but the lectures broadcast live or delayed in audio/video format over the Internet. Webcast was only used at the U.S. university.

Units selected from the Australian university

Two units of study in the field of Economics, "Unit A" and "Unit B" were chosen as the units from which to invite Australian students' participation for this study. Unit A was offered during Semester 2, 2003 and had a total enrolment of 103 students; Unit B was offered during Semester 1, 2004 and had a total enrolment of 75 students. There was no special significance attached to these particular units or the field of Economics. The units were selected simply because they were large undergraduate lecture-style units that utilised the optional online resources in the manner described above.

Unit A and Unit B were typical of many university units in that they included two lectures and one tutorial per week. Different types of assessments were included in the unit, ranging from essays, multiple choice tests and short answer exams. Unit A and Unit B used WebCT as the delivery platform.

Unit selected from the Malaysian Colleges

As previously mentioned, the Malaysian Colleges were partnering with University A in a twinning program. Because of this affiliation, Malaysian students enrolled in Unit A (described above) were invited to participate in the study. Unit A was offered during Semester 2, 2003 (in conjunction with the unit offered to Australian students) and had a total enrolment of 50 students (42 in Petaling Jaya and 8 in Penang).

The Australian/Malaysian twinning program resembled many of the characteristics that are typical of offshore programs. Australian educators developed both the unit content and the online resources. The Malaysian lecturers reviewed and sometimes customised

the materials to the local context before teaching the unit content.   Within this arrangement, the Malaysian students had access to the same online resources as the Australian students by accessing the WebCT website via a password, and thus could access the lectures delivered by the Australian lecturer, as well as the lectures delivered in-person by the Malaysian lecturer.   Malaysian students also had the opportunity to email the Australian lecturer and participate in the online discussion board.[5]

Unit selected from the U.S. university

A unit of study in the field of Human Nutrition (Unit C) was chosen as the unit from which to invite U.S. students to participate.   Once again, there was no special significance attached to the content of the unit; Unit C was selected simply because of its similarity in structure and use of technology to Unit A and Unit B. Unit C was offered during Semester 1, 2004 and had a total enrolment of 749 students.

Unit C offered a similar structure to many undergraduate university units and like Unit A and Unit B, included two lectures and one discussion section (i.e. tutorial) per week. Unit C used Blackboard as the delivery platform, which is a web based tool similar to WebCT.   Unit C utilised three types of online resources similar to those deployed in Unit A and Unit B: communication tools (discussion board and internal unit email), online lecture delivery tools (i.e. webcast) and presentation tools (lecture PowerPoint slides).

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[5] Note that the Malaysian lecturers participating in the twinning arrangement with the Australian university were ethnic Malays (i.e. they were not Australian lecturers on secondment).

Research Instruments

Within a mixed methods approach, a number of different research instruments could have been used to address the research questions. One possible qualitative approach might have been direct observation of students' use of the technology. However, practical constraints would have precluded the sampling of a sufficient range of students and may not have provided the necessary depth of attitudinal data required for this study. One possible quantitative method might have been to track students' online behaviour using computer software to record the number of times each webpage was accessed. This method was used in a study by Harley, et al. (2001); however, the author believed that this approach would fail to capture the richness and complexity of students' attitudes to and interaction with the technology.

Thus, the principal sources of data collected to address the research questions were:

➢ Semi-structured interviews conducted by the author with students and their lecturers

➢ Likert-scale questionnaires distributed to students

These methodologies are briefly described below.

Semi-structured interviews

It is well established in social science research that face-to-face interviews can be highly effective in eliciting detailed, empirical data on a range of topics. In-depth interviews have been described as a "form of conversation" in which topics can be discussed and

explored in a semi-structured and probing manner (Savenye and Robinson, 1996 p.1182).

Semi-structured interviews have several advantages that are relevant to the present study. For example, semi-structured interviews follow a script of questions and thus the researcher can "control" the line of questioning by asking a similar set of questions in approximately the same order (Nachmias and Nachmias, 1992). Supplementary or anecdotal information can be collected during each interview, which is particularly helpful when comparing trends across cultural contexts.

As with any research methodology, interviews also have some disadvantages. Creswell (2003) pointed out that people are not equally articulate or perceptive in interview situations. This was particularly relevant in the present study because of the potential for language barriers between the author (an Australian) and the Malaysian sample group. Newman (2000) pointed out that people from different cultural contexts may experience and interpret the interview questions differently, and in some cultures the survey and interviewing process itself may seem strange to the interviewee. Nachmias and Nachmias (1992) also noted that the mere presence of the researcher may bias the responses.

These potential pitfalls were carefully considered in the design and implementation of the interviews. Thus, despite the limitations of semi-structured interviews, this method was considered to be an appropriate method for targeting the research questions in this study. Different sets of questions were developed for the student and lecturer interviews because more detailed information was required from students than from their lecturers.

Student interviews

A set of semi-structured interview questions were developed to elicit detailed, empirical data on students' attitudes to and use of online resources in higher education (see Appendix II). The interview questions were shaped by a review of the relevant literature (presented in Chapters 2 and 3) as well as consultation with experts in the field of educational technology.

Open-ended questions were used to give participants an opportunity to provide more elaborate answers than would be possible with close-ended questions (Nachmias and Nachmias, 1992). The interview questions were ordered from simple to complex, opening with relatively simple and concrete questions, such as, "What do you like or dislike about the iLecture feature?" and closing with questions that required greater evaluation and reflection, such as "In what ways are online technologies shaping or reshaping teaching and learning in higher education?"

The semi-structured interview consisted of four broad sections. In the first section, participants were asked to comment on their attitudes to and use of three online technologies: communication tools, online lecture delivery tools and presentation tools. Questions and probes were used to elicit students' frequency of use (e.g. "how often do you use the webcast?") and their attitudes to the technology (e.g. "What do you like or dislike about the webcast?").

In the second section of the interview, participants were asked to describe their attitudes to the online resources in relation to teaching and learning at university and comment on the potential benefit of the online resources for their learning. For example, "Do you enjoy using the online resources for your learning?"

In section three, participants were asked to comment on the perceived impact of technology in teaching and learning. This section focused on the extent to which online resources changed or impacted their expectation or experiences of the teaching and learning process. For example, "Has the availability of online resources in higher education changed your thinking on what makes a good teacher?"

Finally, in the fourth section, participants were asked to comment on the use of technology in higher education. These questions required a greater level of reflection and analysis, such as "To what extent do you think that the use of online resources achieves a quality university education?"

Lecturer interviews[6]

Semi-structured questions were also developed for interviews with the lecturers. The purpose of these interviews was to document some illustrative examples of the lecturers' attitudes that may elucidate issues raised by the students. The questions developed for the lecturer interviews were similar to the student interviews, but

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[6] The term "Lecturer" is used to collectively describe the participant teachers who coordinated and taught the units investigated. It does not denote the rank or status of the individual teacher.

specifically focused on the lecturers' use of online resources in their teaching and the impact of technologies on their students' learning (see Appendix VIII).

Questionnaire

Robson (2002) suggested that questionnaires can offer a relatively simple and straightforward approach to the study of attitudes and behaviours. Creswell (2003) also observed that the data generated from questionnaires can be efficient in providing large amounts of data about a broad range of issues within a relatively short period of time. The use of questionnaires has some limitations in that the participant may not report their actual beliefs, and ambiguities and misunderstandings in the items themselves may not be detected. However, questionnaires are still considered a useful way to examine attitudes by many social science researchers (Robson, 2002).

A Likert-type questionnaire was developed to investigate the relationship between students' cultural context and their attitudes to and use of online resources (see Appendix III). The questionnaire was divided into four broad sections according to the areas of interest: Demographics and Ethnicity; Teaching and Learning at University; Website Usage; and Experience with Technology. Eight Likert-type scales were developed that aimed to assess the strength of agreement or disagreement toward a set of statements. The scales were titled: Motivation; Teaching and Learning; Attitude to Online Learning; Online Use (i.e. actual use of the online resources); Administrative Use; Technical Factors; Factors Affecting Use; and, Experience with Technology. The scales were conceputalised as quantitative variables in that each scale was constructed in terms of more or less, better or worse, and so on (e.g. 'strongly disagree/strongly

agree'; 'never/very frequently'; 'no influence/a great deal of influence'). The majority of items included in the questionnaire were closed-ended questions, because as Nachmias and Nachmias (1992) pointed out, this helps lead the participant to express the extent of their agreement or disagreement with a particular point of view.

Two, five and six response categories were used to discriminate more precisely between trends in the cultural groups and provide more information on each group. Where items had six response categories, labels were provided at the endpoints of the scale (points 1 and 6), but the mid-points (2 through 5) were not labelled. The reason for not labelling all the categories was so that respondents could interpret the scale without being distracted by definitions of categories. It has been shown that labelling categories can cause problems in the validity of the data. Andrich (1999), for example, argued that a mid-point or neutral category (e.g. "don't know", "unsure" or "does not apply") is different to the other categories and can act as a "catch all" category in which people respond who do not understand the question and people who are undecided. This difference in interaction can lead to misleading results (Andrich, 1999). The following item is an example of one of the questions included in the questionnaire:

	Strongly Disagree					**Strongly Agree**
12d) I would like to see more money spent on hiring lecturers than investing in new online resources.	1	2	3	4	5	6

A few open-ended and short answer questions were also included in the questionnaire to provide an opportunity for students to elaborate on answers to items.

Construction of the questionnaire items was influenced by a review of the relevant literature (see Chapters 2 and 3) as well as consultation with content experts. Cross-cultural issues were considered in the questionnaire design because as Neuman (2000) pointed out, "each step of survey research (question wording, data collection) must be tailored to the culture in which it is conducted" (p. 406). Short, simple sentences were used to minimise confusion over the wording of the item. Particular attention was given to items that might have a different meaning in the three cultures under investigation. For example, changes were made to the terminology in the questionnaire to suit the local context in the U.S. and Malaysia. For example, in the questionnaire distributed to U.S. students, specific words were changed to reflect the local terminology: 'unit' was changed to 'course'; 'iLecture' was changed to 'webcast' and 'lecturer' was changed to 'professor'.

Some items were designed to be culture-specific in that they showed aspects of a culture that were not meaningful to the other two cultures (Brislin, Lonner and Thorndike, 1973). Prior to implementation of the present study the author was informed that some Malaysian students had not used the website. To accommodate these students, some changes were made to the wording and format in some of the items used in the Malaysian questionnaire. The changes made were based on Ajzen and Fishbein's (1980) "theory of reasoned action", which states that a person's intention to perform (or not to perform) is the immediate determinant of the action. The theory is based on the assumption that people are rational beings who make systematic use of the information available to them. Thus, a person's 'behavioural intention' can be used as an index of a person's actual behaviour (Azjen and Fishbein, 1980).

The changes incorporated into the questionnaire distributed in Malaysia were described as "hypothetical questions", used to elicit students' intended use of the technologies rather than their actual use (see Appendix V). Below is an example of a "hypothetical question", used to assess Malaysian students' behavioural intentions.

Assume that you are using online resources <u>in addition</u> to the learning resources you already have at university.
I think online resources could help my learning because I would . . .

	Strongly Disagree					Strongly Agree
a) Have greater control over my own learning.	1	2	3	4	5	6

The interview questions and questionnaire were reviewed by experts in social science research and experts in the field of online technology who gave feedback on the usefulness, reliability and targeting of each instrument. Changes were made to both instruments in their design and construction based on their recommendations.

Ethical Considerations

This project received approval from Murdoch University's Human Research Ethics Committee (HREC), permit number 2003/257. Murdoch University's HREC is conducted under the Australian National Statement on the Ethical Conduct of Research Involving Humans. This permit gave approval for the research conducted in Australia and Malaysia. Ethical approval was also obtained from administrators at the U.S. university via email correspondence prior to the author's visit.

Consent forms were distributed to participating students and lecturers prior to participation (see Appendices I and VII). The consent forms outlined the project

objectives and emphasised the confidentiality and anonymity of participants' responses. The forms also explained that participation was voluntary. The completed questionnaires, interview tapes and interview transcripts are stored in a secure location and will be stored for a period of five years from the date of collection.

Data Collection Procedures

Quantitative and qualitative data were collected in two separate, concurrent phases from volunteer Australian, Malaysian and American university students and their lecturers. The procedures for data collection in each country are described below.

Questionnaire

Australia

The Australian students who volunteered for this study attended a public research university in Western Australia (University A) described in the previous section. Data were collected over two semesters: Semester 2 (S2), 2003 and Semester 1 (S1), 2004. The students were enrolled in large, undergraduate lecture units, Unit A and Unit B, which were offered as second-year undergraduate units.

For the 2003 data collection, the author met with the students at the end of the Unit A lecture during week 5 of the semester. The project aims were introduced and students were invited to participate by completing the questionnaire developed for this study (see Appendix III). I explained that the students were required to respond to the questionnaire statements by circling a number on a rating scale of 1-6 to show the extent

of their agreement or disagreement with the statement. Students were assured that there were no right or wrong answers and that they should circle the number that most reflected their opinion. I then explained the consent form which was attached to the questionnaire as the cover page.

Students were also invited to participate in a 40 minute interview with the researcher. To organise the student interviews, a sign-up sheet was prepared on which students could write their contact details as an expression of interest. Students were given the option to participate in individual interviews, or in small groups of 2, 3 or 4 students.

After the questionnaire and interview were introduced, students were invited to ask questions. After answering any questions, I then distributed the questionnaire and encouraged students to complete the form. The interview sign-up sheet was passed around the class while students were completing the questionnaire. Students were given 15 minutes during class to complete these tasks, after which time I collected the completed questionnaires and the interview sign-up sheet. One week later, I visited the students enrolled in Unit A for a second time to invite participation from students who may not have attended the previous lecture. In this second, follow-up session the points covered during the first introduction were reviewed and then students were given an opportunity to complete the questionnaire and sign up for interviews. After two consecutive visits, 34 students completed the questionnaire out of a total enrolment of 103 students.

Students enrolled externally in Unit A were also invited to participate via an email sent by the researcher (see Appendix VI). Consent forms were sent in hard copy to

participating external students who returned the signed document by mail. Participating students completed the questionnaire either via an email attachment or via a hard copy sent to them in the mail. Two external students participated via email, bringing the total response to 36 students.

Data collected during S1, 2004 (Unit B) followed exactly the same procedure as described above for both students enrolled internally and externally. After two visits to the Unit B lecture, 15 students completed the questionnaire out of a total enrolment of 75 students. The lower participation rate may have occurred because time constraints did not allow students to complete the questionnaire during lecture time, as had been the case for the Unit A data collection.

Malaysia

The questionnaire was distributed to Malaysian students by the author during visits to Penang and Petaling Jaya during October 2003. The students were enrolled in the twinning component of Unit A, offered in conjunction with the partnering University A. At the time of the author's visit to Penang, five students out of a total enrolment of eight students were present in class. The procedure for introducing, explaining and distributing the questionnaire was exactly the same as described above for the Australian students. All five students completed the questionnaire during class time and also agreed to participate in an interview. The same procedure for data collection was followed in Petaling Jaya. The 38 students present in class completed the questionnaire and 18 students agreed to participate in an interview.

To increase the number of questionnaires in Penang, the questionnaire was also distributed to the summer school students during January 2004. To organise this, I emailed the questionnaire to the unit coordinator who photocopied the questionnaire and distributed it the students. An additional 9 summer school students completed the questionnaire, bringing the total response from Penang to 14.

United States

The questionnaire was distributed to the U.S. students during the author's visit to California during February/March 2004. Because Unit C had a very large enrolment (749 students), I met with the students in discussion section groups (25 students per discussion section) to introduce the project and invite participation. The procedure of explaining, distributing and collecting the questionnaire and interview sign-up sheet was exactly the same as described above for the Australian and Malaysian student groups. After I attended 6 discussion sessions, 126 completed questionnaires were obtained and 21 students signed up for interviews.

Interviews

Student interviews

As previously mentioned, students were invited to express interest in an interview via a sign-up sheet. When the forms were returned, I responded by emailing the students, thanking them for their interest and reminding them of the time and location of their interview. Australian students chose to be interviewed individually by the author. Malaysian students chose to be interviewed in groups of 2, 3 or 4 students. Most U.S.

students chose to be interviewed individually, although a few chose to be interviewed in groups of 2 or 3. Participating students were asked to read and sign a consent form before the interview. Each interview was 35-45 minutes in duration and the interviews were tape recorded and later transcribed.

The interview was divided into four broad sections that corresponded with the central aims of the research: attitudes to and use of specific online resources; attitudes to using online resources in a teaching and learning context; the impact of online technologies on teaching and learning; and broader issues relating to the use of technology in higher education.

At the end of the interview, the researcher briefly summarised the key points raised and participants were asked to verify that the summary was an accurate reflection of their attitudes and opinions. Participants were then given an opportunity to change their answers or provide additional information.

Lecturer interviews

Lecturers in Australia, Malaysia and the United States were also invited to participate in a semi-structured interview. All the lecturers agreed to be interviewed by the author and were involved in the use of new online resources in their teaching. The Australian lecturer and the U.S. lecturer coordinated the units used in this study. The Malaysian lecturer at the PG campus taught Managerial Economics and at the PJ campus, one Malaysian lecturer taught Managerial Economics and the other taught Accounting. The Australian lecturer taught Managerial Economics and the U.S. lecturer taught Human

Nutrition. The interviews were approximately 40 minutes in duration and were tape recorded and later transcribed. Interview questions focused on attitudes to and the use of new technologies (see Appendix VIII).

Summary of Quantitative and Qualitative Data

Overall, 233 students located at universities in Australia, Malaysia and the U.S. completed the questionnaire. Semi-structured interviews were conducted with a total of 54 students and 5 lecturers. The data collected are summarised in Table 4.2 below.

Table 4.2 Summary of qualitative and quantitative data.

Country	Questionnaires			Student Interviews			Lecturer Interviews
	S2, 2003	S1, 2004	Total	S2, 2003	S1, 2004	Total	Total
AU	36	15	55	11	4	15	1
MA (PG)	5	9	14	5	0	5	1
MA (PJ)	38	0	38	13	0	13	2
US	0	126	126	0	21	21	1
Total			**233**			**54**	**5**

Data Analysis

The methods used to analyse the qualitative and quantitative data are discussed separately below.

Qualitative Analysis

In keeping with the interpretative nature of qualitative analysis, the data were analysed for themes, categories and patterns in the data (Creswell, 2003). To assist this analysis,

a computer software package titled, Non-numerical Unstructured Data * Indexing Searching and Theorizing, version 6 (N6) was used to manage the categorising, coding and retrieval of coded text (QSR International, 2002). N6 operates on the basis of an 'index tree system', which refers to hierarchical categories to which text is assigned to form the 'root', 'base data' and 'node categories'. The root is the starting point for the project and data are coded to the base data and node categories. Base data refers to the types of data from which the node categories are formed (in this case, data from the open-ended statements in the questionnaire and the interview transcripts). Node categories were then divided into smaller categories, such as attitudes to PowerPoint slides (as one example of an online resource).

The process of categorising and interpreting data was influenced by the research questions and types of data collected, as well as by the mixed methods approach underlying the study. The node categories in N6 were initially derived from the theories presented in the literature review (see Chapters 2 and 3). When participants' statements did not match the pre-existing nodes, extra nodes were added and refined as necessary. The complete coding tree developed in N6 for the purpose of analysing the qualitative data is located in Appendix X.

Savenye and Robinson (1996) suggested that the nodes generated during an analysis can be used to quantify the data by counting the number of times a given response occurred in the text data. Quantification of the data in this manner was particularly useful in the present research because it facilitated different comparisons across categories, such as attitudes across "all Australians v Malaysians" and "all instrumental v all substantive attitudes" and so on.

Two strategies suggested by Creswell (2003) were employed to enhance the validity and reliability of the qualitative data analysis. One strategy was to triangulate the data by comparing the quantitative and qualitative findings used to study a single problem. Another strategy suggested by Creswell (2003) was to employ a second coder who independently rated twenty-five percent of the interview data according to the coding manual developed for this purpose (see Appendix IX). The percent of agreement between the authors' coding and the second coder was 66%. This slightly low percent of agreement may be because the second coder was required to identify as well as code statements from the entire interview transcript. Differences in coding the statements were quickly resolved when I met with the second coder, and thus the coding can be considered reliable.

Lecturer interviews

The lecturer interviews were analysed thematically and conducted in a similar manner to the analysis of student interviews described above. N6 was used to help manage the lecturers' responses in a similar manner described above.

Quantitative analysis

The validity and reliability of the scales in the questionnaire designed for the present study were established using the Rasch Unidimensional Measurement Models program for polychotomous data (Andrich, Sheridan, Lyne and Luo, 2004). The validity and reliability of the questionnaire was established using the total number of questionnaires

(N = 233). Student scores generated from this analysis were then used in standard statistical analyses using the computer software, Statistical Package for the Social Sciences (SPSS) version 12.0.1 to compare results across the three cultural groups (SPSS, 2003). In the statistical analyses, a sample of 65 questionnaires from the U.S. sample was randomly selected from the original 126 U.S. questionnaires so that the findings were not biased in favour of the U.S. because of a larger original sample as compared to the Australian and Malaysian sample.

Measurement theory, the Rasch model and analysis of the instrument for validity and reliability are described in Chapter 5. The findings from the specific statistical analyses conducted are presented and described in the results chapters (Chapters 6, 7 and 8).

Chapter Five

Validation of Scales

Introduction

In social science research, questionnaires are often used as instruments to measure the strength or intensity of attitudes or opinions. Items or statements with ordered response categories can be designed as instruments to measure particular attitudes when no existing instrument is available (Andrich, de Jong, and Sheridan, 1997). Responses to the items are regarded as an index or manifestation of the presence of the construct of interest (for example, attitudes towards an issue or object), referred to in psychometric literature as *latent traits* – so named because the trait can be measured only indirectly through its manifestation, either through direct observation or by item questions (Eagly and Chaiken, 1993).

As previously explained in Chapter 4, a questionnaire was developed to examine students' interaction with online technologies for teaching and learning (see Appendix III). The questionnaire included eight separate scales, titled:

- ➢ Motivation (MOT) (6 items)
- ➢ Teaching and Learning (TL) (16 items)
- ➢ Attitude to Online Learning (ATT) (81 items)

- ➢ Online Use (OU) (16 items)

- ➢ Administrative Use (ADMIN) (6 items)

- ➢ Technical Factors (TF) (5 items)

- ➢ Factors Affecting Use (FAU) (12 items)

- ➢ Experience with Technology (ET) (9 items)

Twelve other items were included to obtain demographic information.

The eight scales were conceptualised as quantitative variables in that they reflected the presence of a property in terms of better or worse and more or less, using Likert-type rating scales of two, five and six response categories. By assigning successive integers to successive categories in this manner, the rating scale reflected *cumulative* or *ordered response categories*, where each category reflected more of the presence of the property of interest (Wright and Masters, 1982). To analyse the data, it is common to sum the scores across the response categories to give a single index on the variable or trait of interest. For example, in the research presented here, the higher the total score on the Online Use scale, the more the website was used by students.

The purpose of this chapter is to establish, using a variety of psychometric analyses and qualitative evidence, whether each of the scales can be accepted as valid and reliable for the purposes of this study. The psychometric approach used to analyse the data for these purposes is the mathematical measurement model devised by Georg Rasch (Rasch, 1980). In this chapter, I begin with an overview of measurement theory and describe the unique features of the Rasch model. I then describe the results of the Rasch analysis using the Online Use scale to illustrate the analytical processes used for all the scales.

Next, I summarise the results pertaining to the validity and reliability of the remaining seven scales. The last section of this chapter concludes by recommending modifications to the design of the instruments that may improve their psychometric properties in the future.

Measurement Theory and the Rasch Measurement Model

Magnitude and quantity are common concepts that imply qualitative comparisons such as more or less and better or worse, and so on (Andrich, 1988). Measurement theory addresses the process of quantifying these comparisons by positioning the person or objects of interest along an ordered continuum (that is, a variable) so that distances between the points can be compared (Wright and Masters, 1982).

In the physical sciences, both the object being measured and the instrument for measurement fulfil the requirements for objective (or fundamental) measurement. For example, when a ruler is used to measure a person's height, the ruler is independent of the object being measured; it does not measure differently when measuring one person's height from when measuring another person's height. In addition, the ruler has equal interval units that can be positioned on a unidimensional scale, so the height of a person can be compared directly with other persons of very different heights or with an object of much greater height. That is, the unit of the measurement does not vary at different points on the continuum. When this is the case, it is mathematically legitimate to sum the successive integers assigned to the successive units on the ruler (i.e. centimetres) and to assign a measurement (or location on the continuum) to objects or people in

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regard to variables of interest and thereby make direct comparisons between persons or objects.

The invariant comparisons and linear scales that are possible in the physical sciences are not easily obtained in social science measurement. Until recently, it was not possible to achieve objective measurement in the social sciences because no mathematical models existed to enable such measurement. Furthermore, the constructs of interest or latent traits are usually complex and often more abstract in the sense that there are no physical concomitants which can serve as proxies for a construct, such as in research on attitudes to online resources.

Psychometricians have tried to achieve objective, rather than descriptive measurement of latent traits since the 1920s. Thurstone's (1928) seminal paper stated explicitly that because attitudes are complex and multidimensional, they cannot be described completely by any numerical index or represented on a linear continuum. However, in the same article, Thurstone (1928) also suggested that when opinions are taken as an index of attitudes, it is possible to measure people's attitudes as expressed by the acceptance or rejection of opinions. He argued that, "since in ordinary conversation we readily and understandably describe individuals as more and less pacifistic or more and less militaristic in attitude, we may frankly represent this linearity in the form of a unidimensional scale" (p. 221).

According to Thurstone (1928), it is necessary to "force" intuitive or qualitative observations onto a linear scale, which he attempted to accomplish by his Law of

Comparative Judgement (LCJ) (p. 218). The LCJ is a set of equations that define the psychological scale or continuum, which Thurstone (1959) described as:

> [T]he experimentally observed proportion $p_{1>2}$ of judgments "1 is stronger (better, lighter, more excellent) than 2" as a function of the scale values of the stimuli, their respective discriminal dispersions, and the correlation between the paired discriminal deviations. (p. 47)

The LCJ has been important in the development of objective measurement because it allows items that have no physical properties (i.e. statements) to be located within a conformable set of items which can then be used to measure people's attitudes on a psychological continuum (Andrich, 1996).

The pioneering work of Thurstone in the 1920s was further developed by Likert (1940s), Guttman (1950s) and Rasch (1960s), so that it is now possible to achieve objective measurement of attitudes (Andrich, 1978). One of the most elegant approaches to objective measurement is the model devised by Danish mathematician and statistician Georg Rasch in the 1960s called the Simple Logistic Model (SLM) (Andrich, 1978). As will be explained, this model fulfils the requirements for objective measurement for dichotomous items. Its extension to polychotomous items, known as the Extended Logistic Model (ELM), is particularly appropriate for cross-cultural research because of its properties of invariant comparisons across people and items and linearised scales.

The Rasch Model

The psychometric research conducted by Georg Rasch in the 1960s marked the point at which psychometrics moved from being purely descriptive to objective (or fundamental) measurement. The Rasch measurement model is classified within Item

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Response Theory (IRT) or Latent Trait Theory (LTT), which as the names suggest,

focus on the characteristics of individual test items and their relationship to the latent

trait. Acton (2003) defined the Rasch model as:

> [A] one-parameter logistic model within item response theory in which a
> person's level on a latent trait and the level of various items on the same latent
> trait can be estimated independently yet still compared explicitly to one another
> (p. 902).

Using the Rasch model, person and item measurements can be located on the same

equal-interval linear scale.

The Rasch model requires that measurement functions independently of the persons or

items being measured. Rasch was the first to describe the possibilities of measurement

objectivity in the social sciences, which he developed into the Simple Logistic Model, a

probabilistic model based on the interaction between one item parameter ("difficulty"

(δ)) and one person parameter ("ability" (β)) (Rasch, 1961). In the context of the

research presented here, the "ability" parameter can be thought of as the strength of a

person's attitude to the use of the online resources for their learning, and the "difficulty"

parameter can be thought of as the intensity of an item (how easy or difficult the item

may be for a person to agree or disagree with). When the data fit the Rasch model, the

measurements are invariant across the people and items being measured.

To illustrate these features of the Rasch model, it is useful to consider the deterministic

framework developed by Louis Guttman in the 1950s. The Rasch model is compatible

with the Guttman structure and has been described as "the probabilistic counterpart of

the ideal of the Guttman response pattern" (Andrich, 1982 p. 96).

The Guttman structure

The Guttman structure operates on the basis of a deterministic framework. The simplest case is that of dichotomous items, such as a test of ability or competence on a certain variable or latent trait. For example, "Yes" shows the presence of the variable or construct (scored 1) and "No" does not show the presence of the variable or construct (scored 0). This assumes that items are ordered in terms of difficulty on an implied continuum; thus, the greater the total score, the greater the presence of the indicator. In a Guttman structure, if a person is to the right of an item he or she will always succeed on it; that is, demonstrate a greater presence of the indicator. A graphical representation of the responses to one item is shown below in Figure 5.1:

Figure 5.1 The Guttman response probability for a single item.
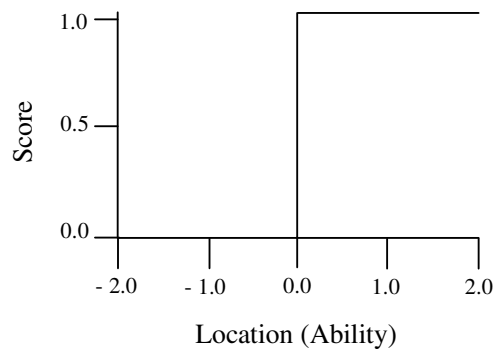
When a person answers an item that is scored dichotomously, they should theoretically answer all items below his or her ability on the latent trait correctly and answer all items above his or her ability incorrectly. However, the ideal of a Guttman scale is difficult to achieve in real test situations because people do not always respond according to their ability or in a manner that is truly reflective of their competence because of factors such

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as guessing or a lapse in attention or concentration. If the responses do not conform exactly to the Guttman pattern, then it is difficult to sum the scores and conclude that one person has more of the trait than another (Andrich, 1982).

To address this problem, Rasch developed a probabilistic model which accounts for the possibility that a person may be incorrect on an easy item and correct on a hard item. Thus, if a person is to the right of an item, he or she has a higher probability of succeeding on it than if they are on or below the item. Where the Guttman curve is comprised of only horizontal and vertical linear components, the Rasch model curve is non-linear and increases smoothly as the location of the person increases relative to the location of the item (Andrich and Styles, 2004). The Rasch model curve is called an Item Characteristic Curve (ICC) which is described in more detail in the next section. The relationship between the Guttman structure and the Rasch probabilistic curve is illustrated below in Figure 5.2:

Figure 5.2 The Guttman curve and the ICC for an item for the Rasch model.
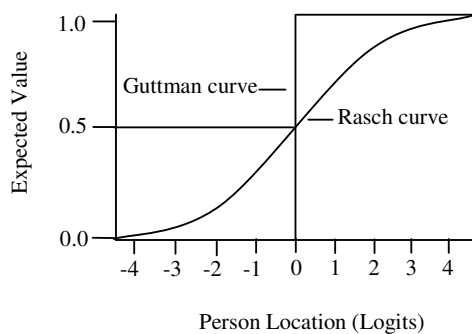
According to the Rasch model, the probability of success depends on the interaction between the person ability (β) and the item difficulty (δ). If a person with ability β responds to an item with difficulty δ, the probability of getting the item correct (with a

probability of 1) is a function of (β - δ). For dichotomous responses, the estimate of the

probability of a correct response person *n* on item *i* is expressed logarithmically as:

$$P\{X_{ni} = x\} = \frac{1}{\gamma_{ni}} \exp(\beta_n - \delta_i)$$

where $X_{ni} = x$ takes the values of 0 and 1; $\beta_n - \delta_i$ are the locations of the person and

the item on the continuum, and γ_{ni} is the sum of the two numerators that ensures that

the probability of the two responses sums to 1 (Andrich and Styles, 2004). The

relationship between a person's ability and item difficulty on a test is the same as an

individual's strength of belief about an aspect of online learning and the degree of

support for that aspect of online learning expressed as a statement on an attitude scale.

The units on the scale given by this formula are called 'logits', which means the "log

odd" units; the natural log of the odds of success. The difference between the person

location and item on the scale yields the log odds (logits) of responding correctly.

Distinguishing Features of the Rasch Model

Two fundamental properties of the Rasch model are that the measurement of the person

may be considered to be on a linear scale and that these measures are invariant across

designated groups for which the fit has been confirmed. These distinguishing features

are explained below by comparing them to Traditional Test Theory.

Invariant comparisons

One of the limitations of Traditional Test Theory (TTT) is that it does not fulfil the

criteria of *invariant comparisons* necessary for objective measurement. In TTT, the

ability of a person is defined in relation to the difficulty of the test items. The total score refers to the number of items on a specific test that the person passed; thus, the measurement of the person is *test dependent*. Furthermore, the difficulty of an item is *sample dependent,* defined in relation to the specific group of persons who take the test. Thus, the reciprocal relationship between the person and item parameters means that invariant comparisons cannot be achieved (Andrich, 2004). In TTT, the ability of a person can only be defined in relation to their performance on a set of items and the difficulty of the item depends on the ability of the persons who take the test (Andrich, 2004).

The Rasch measurement model facilitates two invariant comparisons. Firstly, the Rasch model offers *test free person measurement*, which refers to the process of estimating the person's abilities and locating the person on the same continuum or variable. Test-free person measurement compares the abilities of two persons who took different tests (for example, one easy and one difficult test). As long as the items define the same variable and have been estimated together at some stage in the development process, the same values for a particular measurement will be obtained regardless of the particular items used and persons measured.

Secondly, the Rasch model offers *sample free item calibration*, which compares the difficulty of two items that were completed by two different groups, one more able than the other (Andrich, 2004). In his paper, "On General Laws and the Meaning of Measurement in Psychology", Rasch (1961) listed two criteria for measurement within the social sciences as follows:

The comparison between two stimuli should be independent of which particular individuals were instrumental for the comparison, and it should also be independent of which other stimuli within the considered class were or might also have been compared.

Symmetrically, a comparison between two individuals should be independent of which particular stimuli within the class considered were instrumental for comparison, and it should also be independent of which other individuals were also compared, on the same or on some other occasion. (p. 332)

Because the Rasch model facilitates invariant comparisons, items administered to different samples of people at different times can be jointly analysed to establish whether they may be placed onto a common scale. If items can be placed on a common scale, the scores will be comparable regardless of the particular items administered (Andrich and Styles, 2004). This is a particularly important feature for cross-cultural research because people's attitudes can legitimately be compared across cultures using different questions, as long as there is a set of items common to all groups being compared. The common set provides the means of linking all items together to form one unidimensional continuum.

As previously mentioned, the Rasch models are independent of any data sets and to establish construct validity the data should conform as closely as possible to the model. Once validity has been established, the scale is regarded as a unidimensional scale that has internal or construct validity. The fact that the Rasch model fulfils these requirements of invariance sets it apart from TTT, where the process of data analysis is more experimental; if the chosen model does not fit the data, another model for the same kind of data is applied (Andrich, 2004).

Linear scale

In both TTT and the Rasch model, the total score is the relevant statistic used to characterise the person and item. However, the raw scores obtained from the response categories (such as on a Likert scale) are not linear and cannot be legitimately summed. Without some transformation of the raw data, there may be distortions at both ends of the scale, making the distance between persons at the extreme ends of the scale look smaller than they actually are (Wright and Masters, 1982). It is unlikely that items and persons would be evenly spaced and score distributions may become skewed when the mean of the group approaches the highest or the lowest extremes. Generally, the ability gap between two persons near the extremes of the scale is larger than between two persons in the middle of the scale. For example, on a test the differences between scores of 90 and 95 or 5 and 10 are larger than the difference between 50 and 55. The non-linearity of raw scores is known as the "floor and ceiling effect". However, all statistical tests assume linearity, so before any standard statistical analyses can be conducted, the item scores and ability scores must be re-expressed on a linear scale (Wright and Masters, 1982).

In the Rasch model, scores are not affected by floor and ceiling effects because the raw scores are transformed into a linearised score (i.e. logits) which can be treated as equal-interval measurements and legitimately used in standard statistical analyses. This transformation removes any distortions at both the extremes of the scale and shows the variable in a form which does not depend on how the items are targeted (Wright and Masters, 1982).

The transformation of raw scores in the Rasch model satisfies two conditions that are necessary in order for a scale to be quantitative: *additivity*, which means that the scores for the person and item variables can be legitimately summed (also referred to as additive conjoint measurement*)*, and *ordinality*, which means that the Rasch model possesses ordinality because person and item variables can be legitimately compared as being higher or lower, more or less (Acton, 2003).

The Rasch model and cross-cultural research

To my knowledge there has only been one study that employed the Rasch analysis in cross-cultural research (Snider and Styles, 2005). Yet the characteristics of the Rasch model make it ideal for such a context because the invariance properties of the Rasch model provide better measures than those from traditional test theory and thus can strengthen research findings in this area.

RUMM 2020 software

The Rasch Unidimensional Measurement Models program (RUMM 2020) (Andrich, Sheridan, Lyne and Luo, 2004) is a sophisticated computer program that provides a variety of information about the extent to which the data fit the Rasch model. RUMM output gives location estimates for the difficulty (or intensity of the item) and the ability (or strength of a person's attitude) for either dichotomous or polytomous items, or both together. RUMM output also gives a Person Separation Index (PSI) which is an index of reliability similar to the Cronbach Alpha in Traditional Test Theory. PSI is a more accurate estimation of internal consistency than the Cronbach Alpha because RUMM

uses parameter estimates (item difficulty and person ability) rather than raw scores. The Cronbach Alpha can only be calculated on a complete data set, whereas the Rasch model does not require that every person completes every item.

In addition, the RUMM output provides several types of *fit statistics,* which show how well the items or persons fit a unidimensional scale according to different criteria. These tests are: the overall Chi test item-trait interaction test of fit; the individual item-trait interaction tests of fit; the log residual item tests of fit; and the log residual person tests of fit. Misfit of items is gauged by visual inspection of the Item Characteristic Curves (ICCs). Misfit of response categories can be diagnosed through visual examination of the Category Characteristic Curves (CCCs) and the position of the thresholds between each adjacent pair of response categories. These tests are briefly described below.

Category Characteristic Curves

Analyses conducted using the RUMM 2020 software provide information about whether the response categories for each item are properly ordered in increasing difficulty or intensity, so that a greater category score implies more of the trait or construct of interest. The response probabilities are expressed graphically in Category Characteristic Curves (CCCs), which show the probabilities of responding in each category, across the range of person locations.

The point of intersection between the category characteristic curves is called *thresholds* which show the points where the probability of each adjacent response is equally likely

(such as the probability of scoring a 1 or 2). For instruments using six response categories, there are five thresholds and each of these qualifies the average intensity of the item. For example, Figure 5.3 below shows the CCC for Item 15c (*"I believe the availability of new online resources would enable me to learn more efficiently and effectively)* with six response categories. Figure 5.3 shows six response categories with five thresholds, marked *T1 – T5* on the horizontal axis.

Figure 5.3 Category Characteristic Curves for Item 15c showing properly ordered thresholds for a six-point rating scale.
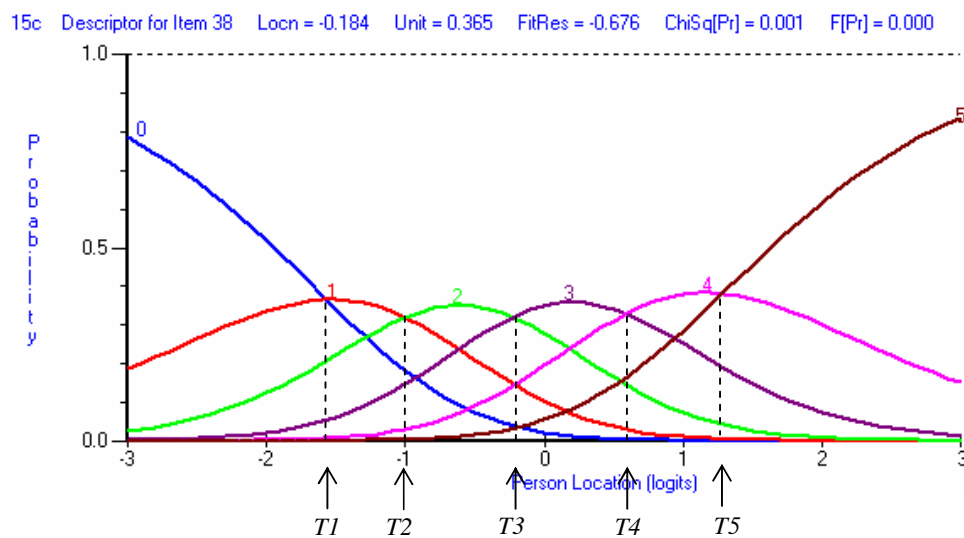
In this case, the pattern of the CCCs shows that if a person is low on the scale relative to the item's intensity, the person is most likely to respond in the category 0; if the person's level is far greater than the item's intensity, then the most likely response is a score of 5; and the person has moderate level of, say, 0.25 logits, then the most likely score is a 3, and so on.

Disordered thresholds are problematic in the Rasch model because they indicate a misfit between the data and the model. The reasons for this and the possible remedies are discussed in the next section in relation to the results from the Online Use scale.

Item Characteristic Curves

Output from RUMM 2020 produces theoretical curves of expected response probabilities called Item Characteristic Curves (ICCs). ICCs show the score that should have obtained if the item had conformed exactly to the Rasch model and the scores that were actually obtained. The horizontal axis can be thought of as the continuum representing the latent trait (the Expected Curve) and the vertical axis indicates the theoretical and obtained mean scores (the Obtained Value).

Figure 5.4 below shows the ICCs for three items of increasing intensity from the Online Use scale. Items 18a, 18b and 18c begin with the question, *How often do you listen to the online lecture recordings?*, with the corresponding stems: *To review sections of the lecture after attending the live lecture*; *As a backup (after I miss a lecture I intended to attend)*; and, *Instead of attending the live lecture*. The slopes of the graphs are parallel, indicating it is mathematically legitimate to use a total score as an index of a person's location. In Figure 5.4, the relative locations of the items are intuitively correct because people indicated that they used the online lecture recordings as a backup more than they used it instead of attending lectures or reviewing the lecture after attending the live lecture.

Figure 5.4 Item Characteristic Curves for Items 18a, 18b and 18c.
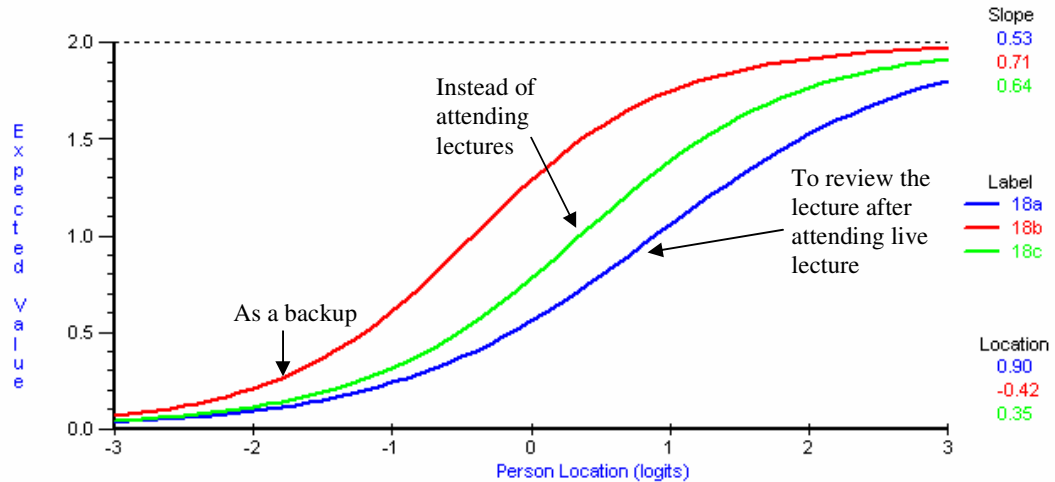
Summary

The Rasch model provides the same properties of invariant comparisons and linear scales to social science measurement as those required for objective measurement in the physical sciences. Scales are considered valid if the data fit the Rasch model. There are several tests of fit that can be conducted using the RUMM 2020 software to check the extent to which the data fit the Rasch model. There are no single criteria for determining fit; many different tests are examined qualitatively and quantitatively to determine whether the data fit the model. Three tests that are particularly relevant to the research in this thesis are: the fit statistics, ICCs and CCCs. If the data are deemed to be acceptable according to these criteria, the scale is considered to have achieved invariant comparisons on a unidimensional scale. In the next section, the results of these tests of fit are discussed in relation to the scales derived from the instrument developed for this study.

Organisation of Findings

This section describes and explains the analytical processes used to establish the validity and reliability of the eight scales derived from the questionnaire developed for this study. Five of the scales assessed students' attitudes to the online resources: Motivation (MOT), Teaching and Learning (TL), Attitude to Online Learning (ATT), Online Use (OU) and Administrative Use (ADMIN). Three of the scales assessed the factors that influenced students' use of the technology: Technical Factors (TF), Factors Affecting Use (FAU), and Experience with Technology (ET). For brevity, not all the scales are described in detail in this chapter. To illustrate the analytical processes that were used for all the scales, I describe the results from the Online Use scale in detail and present only summaries of the other seven scales. Further details on the Rasch analyses conducted for the remaining seven scales are presented in Appendix XI.

Analyses pertaining to establishing the construct validity and reliability of the Online Use scale are presented in the following order:

- Location of threshold estimates
- Fit of items and persons to the model
- Targeting: Item/person distribution
- Order and locations of items
- Validity and reliability: Conclusions from the analyses

A summary of the remaining seven scales is presented at the end of this chapter.

The Online Use Scale

The Online Use scale (OU) included 16 items that assessed students' actual use (i.e. behaviour) of the online resources. All items in the Online Use scale had 6 response categories, except for Items 23 and 24 which had 4 and 5 response categories respectively. Responses to statements with 6 response categories were scored with 0 representing the lowest level or least amount of the trait and 5 representing the greatest amount of the trait. In this scale, the higher the total score, the more often students used the online technologies.

Location of Threshold Estimates

The functioning of the thresholds impacts on both the validity and reliability of the instrument. Thus, the first analysis examined the extent to which the response categories for each item were correctly ordered. Ideally, each threshold estimate should be ordered from the lowest (between categories 0 and 1) to the highest number (between categories 4 and 5). Table 5.1 below shows the threshold estimates for all the items in the Online Use scale.

Table 5.1 Threshold estimates for the Online Use scale.

Item	Location	Mean	Threshold 1	Threshold 2	Threshold 3	Threshold 4	Threshold 5
16b	-0.62	0	-0.13	-0.17	-0.21	-0.04	0.57 *
16c	0.78	0	-0.04	-0.17	-0.23	-0.05	0.51 *
16d	-0.35	0	0.36	0.03	-0.28	-0.31	0.19 *
17a	0.05	0	0.02	-0.36	-0.08	0.27	0.14 *
17b	-0.38	0	0.39	-0.03	-0.16	-0.12	-0.06 *
17c	0.01	0	0.15	-0.12	-0.08	0.03	0.01 *
17d	-0.36	0	-0.08	-0.16	-0.29	-0.13	0.67 *
18a	0.43	0	0.35	-0.68	-0.18	0.50	0.01 *
18b	-0.17	0	0.47	0.02	-0.24	-0.26	0.01 *
18c	0.15	0	0.94	-0.65	-0.12	0.53	-0.70 *
18d	0.59	0	0.36	-0.70	-0.18	0.51	0.00 *
18e	0.05	0	0.20	-0.32	-0.45	-0.13	0.71 *
18f	-0.07	0	0.52	-0.29	-0.56	-0.27	0.61 *
18g	0.24	0	0.64	-0.80	-0.30	0.49	-0.03 *
23	-0.42	0	-2.71	1.08	1.63		
24	0.05	0	0.69	-0.33	0.31	-0.67 *	

* Denotes disordered threshold estimates.

Table 5.1 shows that all of the threshold estimates were disordered, except for Item 23. Item 23 (*"On average, how many times did you visit the website per week?"*) worked well with the original four categories and the threshold estimates were in the correct order of ascending numerical value (-2.71, 1.98, 1.63). The probability curves shown in the Category Characteristic Curve for Item 23 in Figure 5.5 exhibit the pattern expected for ordered thresholds.

Figure 5.5 Category Characteristic Curve for Item 23 using original number of response categories.
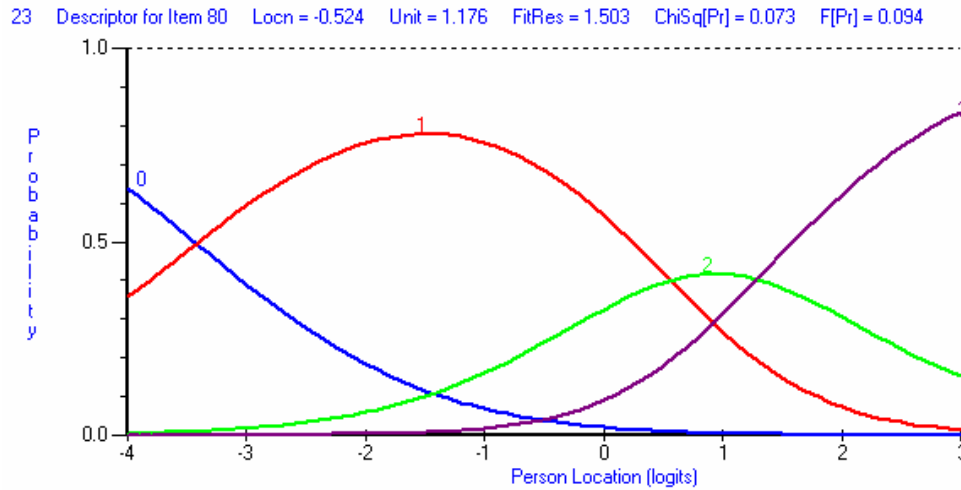
All the other threshold estimates for items in the Online Use scale were disordered, indicating that the order of categories was not operating according to expectations. The disordered (or reversed) thresholds in the Online Use scale items indicate a problem in the empirical ordering of the response categories and a mismatch between the data and the model (Andrich, et al., 1997). Disordered thresholds are a problem because if the thresholds are not ordered along a unidimensional scale for a single latent trait, the responses cannot be legitimately summed (Andrich, et al., 1997).

Reversed thresholds are often present because respondents were unable to judge differences between the categories. It usually indicates there are either too many categories for respondents to distinguish between, or the category labels are ambiguous. In this case, only the two end points were labelled, so a more likely explanation is that the there were too many categories for respondents to distinguish them adequately (Andrich, 1988).

Threshold estimates on the Online Use scale were more disordered on some items than others. For example, the threshold estimates for Item 18b were more disordered than for Item 17a, as shown in Figures 5.6 and 5.7 below. Item 17a asked, *"How often do you use the pre-lecture and lecture PowerPoint presentations"*, with the attached stem, *"to link to my reading of the relevant chapters before attending the lecture?"* The CCC for Item 17a in Figure 5.6 shows the effects of disordered thresholds graphically. Figure 5.6 below shows that it is "easier" for a person to choose 1 or 2 than 0, and easier to choose 5 than 3 or 4. That is, if a person is low on the scale as a whole, the person is more likely to choose a 1 or 2 than a 0. A person higher on the scale as a whole is more likely to choose a 0 than a 1 or 2.

Figure 5.6 CCC for Item 17a showing disordered threshold estimates.
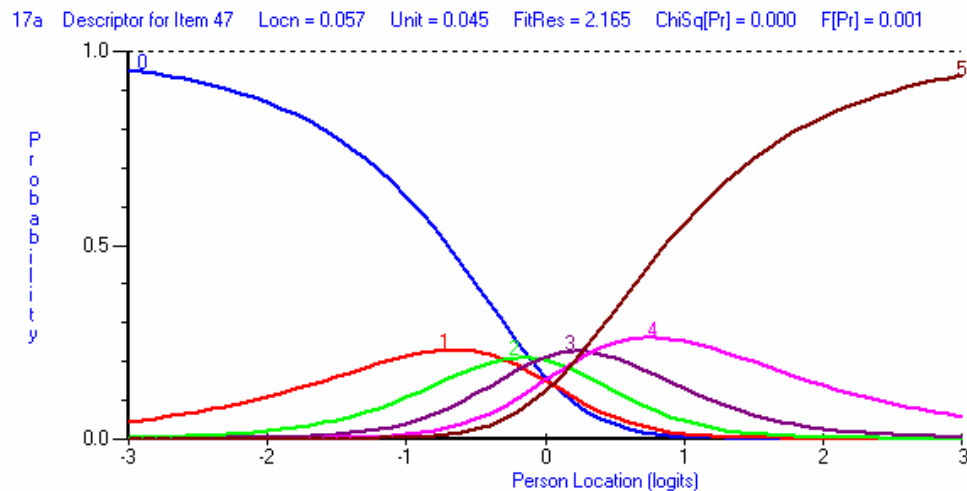
Item 18b asked, *"How often do you listen to the online lecture recordings"* with the attached stem, *"As a backup (after I miss a lecture I intended to attend)"*. Figure 5.6 shows that the threshold estimates were even more disordered than those in Item 17a. The curves for categories 1, 2 and 3 were much less prominent than the other curves

(Figure 5.7). That is, a student who did not listen to the lectures very often might be expected to score 0, and should always have a greater probability of scoring a 1 than a 2. The disordered thresholds indicate that these categories were "less popular or less attractive" (Andrich et al., 1997 p. 63). However, as Andrich et al. (1997) pointed out, this is only a description of the distribution and not an explanation of why the middle categories were less attractive than they should be for those for whom it should be the most attractive. The presence of disordered thresholds does not mean that there were fewer people in categories 1, 2 and 3 (with respect to the frequency of responses); rather, it means that persons who should have responded in categories 1, 2 and 3 did not do so at the expected rate.

To clarify the meaning further, the threshold estimates for Item 18b (Figure 5.7) show that the curves for categories 2 and 3 had a lower value than the threshold between the curves for 0 and 1. There is no region on the continuum where a score of 1, 2, 3 or 4 is most likely. That is, even in the region of abilities where one might expect a score of 2 or 3, people are more likely to choose either a 0 or a 5, which means that as the ability of the person increases, the probability of responding with a higher score does not increase systematically.

Figure 5.7 Item 18b showing disordered thresholds.

18b   Descriptor for Item 52   Locn = -0.171   Unit = -0.060   FitRes = 0.296   ChiSq[Pr] = 0.019   F[Pr] = 0.012
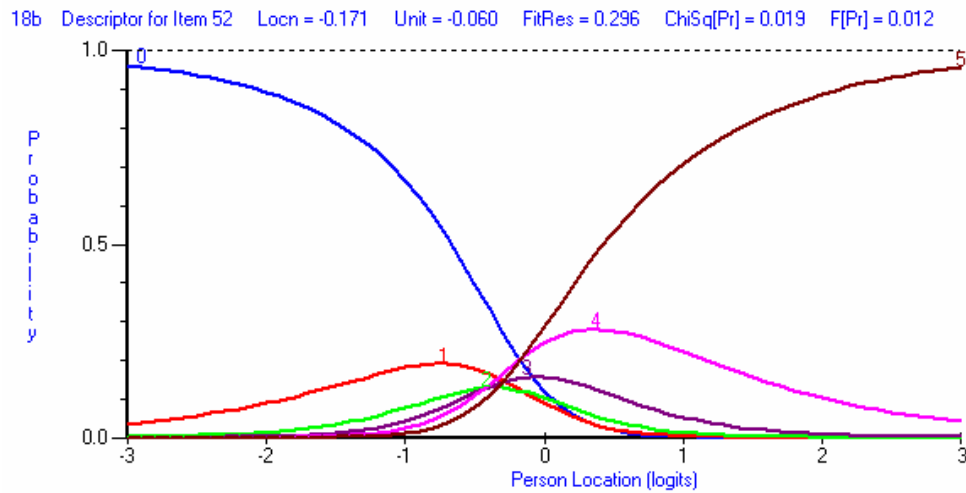
Thresholds using reduced categories

It is generally agreed that reducing the number of categories (or rescoring) may not be compatible with the Rasch model and ideally should not be done *post-hoc* (Andrich and Styles, 2004). This is because the meaning of each individual category is associated with the meaning of every category in the set of categories. Clearly, responding to an item with six categories requires a different decision than responding to an item with two categories.

However, when threshold estimates are disordered, it is sometimes appropriate to reduce the number of categories on individual items *post hoc* to check whether such an adjustment is necessary[7]. Andrich et al. (1997) suggested that reducing categories *post*

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[7] Ideally, new data could then be collected using the adjusted number of categories; however, it was not possible to follow this ideal procedure in the case of this project.

hoc may reveal the most effective number and ordering of categories and may provide

more precise estimates of the item locations. Andrich et al. (1997) stated that:

> Collapsing existing categories or restructuring the format for further data collection, understanding and correcting disordering provides unique diagnostic opportunities for understanding the variables of measurement operationalised by items with ordered response categories. (p. 68)

Based on this reasoning, all the items in the Online Use scale were rescored with the

exception of Item 23, which worked well with the original four categories. Item 24 was

rescored from the original five categories to three categories by collapsing adjacent

categories. All other item categories were rescored from the original six response

categories to three response categories. The descriptors at the end of categories

remained unchanged ("Never/Very Frequently"), since the middle categories were not

labelled in the original questionnaire. The descriptors for Item 24 ("*On average, how*

much time did you spend listening to the online recorded lectures per week?") changed

to "Not at all", "5-15 minutes", "15-30 or more minutes".

Table 5.2 lists the threshold estimates of the Online Use scale after the items were

collapsed to three categories. Results showed that threshold estimates worked better

with the reduced number of categories.

Table 5.2 Item threshold estimates in the OU scale using three categories instead of six categories.

Item	Location	Mean	Threshold 1	Threshold 2	Threshold 3
16b	-1.24	0	-0.28	0.28	
16c	1.50	0	-0.21	0.21	
16d	-0.81	0	0.12	-0.12 *	
17a	0.15	0	-0.45	0.45	
17b	-0.82	0	0.05	-0.05 *	
17c	0.04	0	-0.13	0.13	
17d	-0.75	0	-0.28	0.28	
18a	0.89	0	-0.55	0.55	
18b	-0.41	0	0.20	-0.20 *	
18c	0.35	0	-0.13	0.13	
18d	1.22	0	-0.57	0.57	
18e	-0.05	0	-0.29	0.29	
18f	-0.34	0	-0.10	0.10	
18g	0.43	0	-0.47	0.47	
23	-0.52	0	-2.89	1.08	1.81
24	0.36	0	0.01	-0.01 *	

* Denotes disordered threshold estimates.

Table 5.2 shows that reducing the number of categories yielded ordered threshold estimates for all but four of the items. This is illustrated in Figures 5.8 and 5.9, showing that Item 17a (Figure 5.8) worked well with three categories, whereas Item 18b (Figure 5.9) still did not work as expected even with three categories.

Figure 5.8 Category Characteristic Curve for Item 17a using three categories instead of six categories.

17a   Descriptor for Item 47   Locn = 0.152   Unit = 0.450   FitRes = 1.134   ChiSq[Pr] = 0.007   F[Pr] = 0.012

[Graph: Probability vs Person Location (logits), x-axis from -3 to 3, y-axis from 0.0 to 1.0, curves labeled 0, 1, 2]

Person Location (logits)
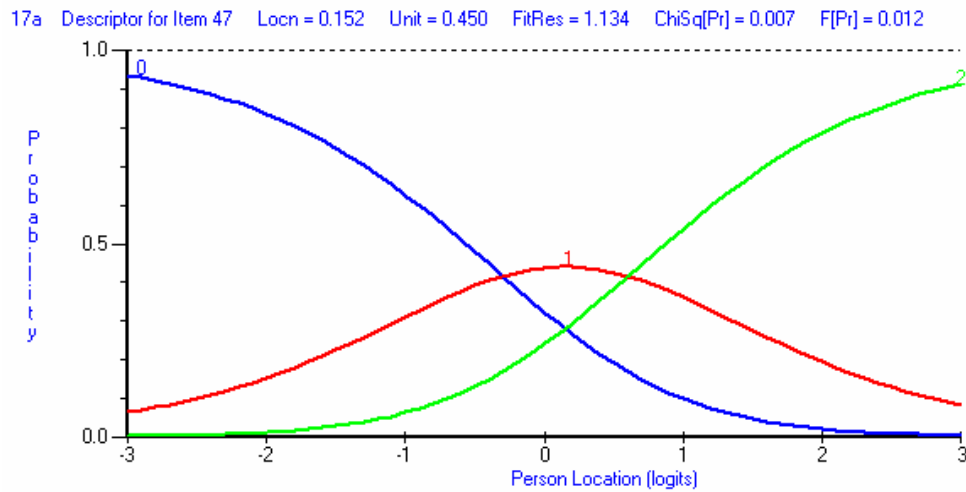
Figure 5.9 Category Characteristic Curve for Item 18b using three categories instead of six categories.

18b   Descriptor for Item 52   Locn = -0.417   Unit = -0.202   FitRes = -0.210   ChiSq[Pr] = 0.051   F[Pr] = 0.033

[Graph: Probability vs Person Location (logits), x-axis from -3 to 3, y-axis from 0.0 to 1.0, curves labeled 0, 1, 2]

Person Location (logits)
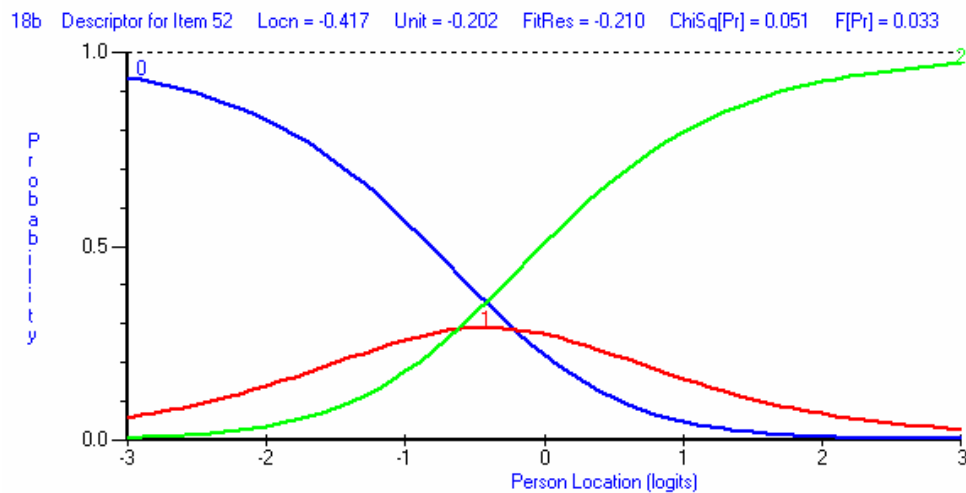
Reliability

After the item categories were reduced from six to three categories, the reliability still

showed an acceptable level. Before the categories were reduced, the Person Separation

Index (similar to the Cronbach Alpha) = 0.93. After reducing the number of categories,

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the PSI = 0.89. The high value of this index indicated that people were still well separated even with fewer response categories. Thus, the fewer categories did not have a substantial impact on the overall reliability. The remainder of the analyses for the Online Use scale were conducted using the collapsed category data.

Fit of Items and Persons to the Model

After establishing the order of the threshold estimates, the next task was to examine the fit of the items and persons to the Rasch model. To establish the fit of items to the model, several criteria need to be considered: the item-trait interaction test of fit (χ^2), the log residual test, and the graphical fit in the ICCs. No one test of fit is sufficient to make a decision about the overall fit of items to the model.

First, the expected value response in each of four class intervals of total person scores was compared with the actual value of responses. The comparison is called an item-trait 'test of fit' interaction (χ^2) (Andrich, 2004), values for which are presented in Table 5.3. Misfit of items is judged by sudden increases in the χ^2 values. Table 5.3 shows that most of the χ^2 values increased gradually, indicating that the fit of the items to the model is acceptable. Item 18e is the least well-fitting item.

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Table 5.3 Two sets of fit statistics (log residual and χ^2) and trait interaction.

Item	Location	SE	FitResid	DF	ChiSq	DF	Prob
18c	0.35	0.10	0.74	197.44	2.19	3	0.53
16c	1.50	0.14	-0.73	198.37	3.55	3	0.31
24	0.36	0.10	-0.86	195.59	6.61	3	0.08
18g	0.43	0.11	-0.81	198.37	6.85	3	0.07
23	-0.52	0.11	1.50	197.44	6.97	3	0.07
17d	-0.75	0.10	0.80	199.29	7.35	3	0.06
18b	-0.41	0.09	-0.21	198.37	7.75	3	0.05
17c	0.04	0.10	-1.31	199.29	8.33	3	0.04
18f	-0.34	0.10	-0.62	197.44	8.40	3	0.03
17b	-0.82	0.10	0.23	199.29	9.45	3	0.02
17a	0.15	0.10	1.13	199.29	11.99	3	0.007
16d	-0.81	0.10	0.83	198.37	13.91	3	0.003
18d	1.22	0.12	-1.26	198.37	14.98	3	0.001
18a	0.89	0.12	-1.83	198.37	15.74	3	0.001
16b	-1.24	0.11	1.44	199.29	18.21	3	0.001
18e	-0.05	0.10	-2.76	197.44	20.15	3	0.001

The second test of fit was the log residual test which shows the fit of the actual responses across all persons compared with expected responses. For the purposes of this project, the value of this statistic indicating significant misfit was $>\pm 3.0$. In the Online Use scale, none of the statistics were significant. Item 18e comes the closest to showing misfit with a fit statistic of -2.76, indicating a tendency to overdiscriminate amongst people. This was also reflected in the χ^2 test of fit, as already mentioned.

The third indicator of fit is the graphical analysis of the items. This involved taking the five items with the largest χ^2 values and examining the extent to which they obtain values on each item for four groups of people with increasing mean locations across the continuum.

The ICCs for Items 18c, 17a and 18e shown below (Figures 5.10, 5.11 and 5.12) illustrate the relationship between the observed values and the theoretical curve. Three examples are shown below to demonstrate a good fit to the model (Figure 5.10); an

underdiscriminating item (Figure 5.11); and an overdiscriminating item (Figure 5.12).

Figure 5.10 below shows that Item 18c (*"How often do you listen to the online lecture recordings instead of attending the live lectures?"*) fits the model very well, with the observed proportions (the dots) positioned very close to the ICC.

Figure 5.10 Item Characteristic Curve for Item 18c comparing the mean responses in four class intervals to the theoretical curve.
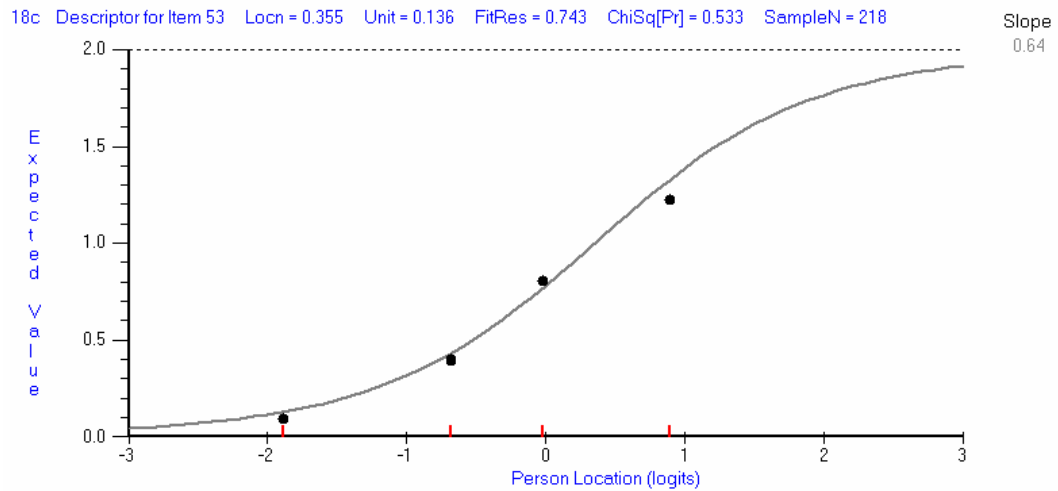
Figure 5.11 below shows the underdiscrimination of Item 17a. The observed proportion of people in each class is flatter than the theoretical curve, which is particularly noticeable in higher logit range.

Figure 5.11 ICC for Item 17a showing the underdiscrimination of the mean responses when compared to the theoretical curve.
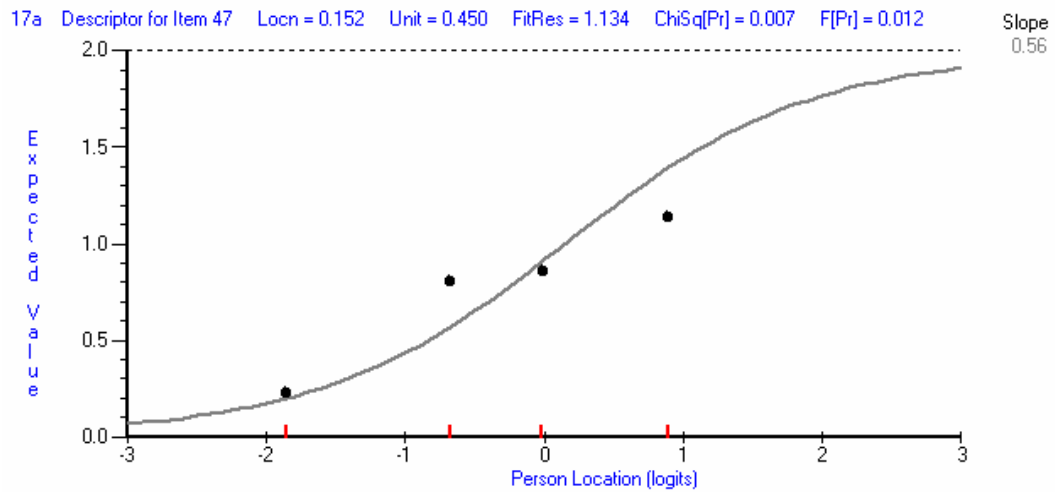
Overdiscrimination often indicates that another factor (in addition to the variable being measured) is impacting a person's responses; the observed proportions are steeper than the theoretical curve. That is, if a person tends to agree with the other items on the scale, then the person is even more likely to agree with the particular item than the average expected agreement for that item. It may also be that the results for this item have been obtained by chance. This is illustrated in Figure 5.12 below; however, even here for this worst-fitting item, the obtained values tend to follow the expected curves.

Figure 5.12 ICC showing the Expected Values and the Observed Means of an overdiscriminating item (Item 18e).
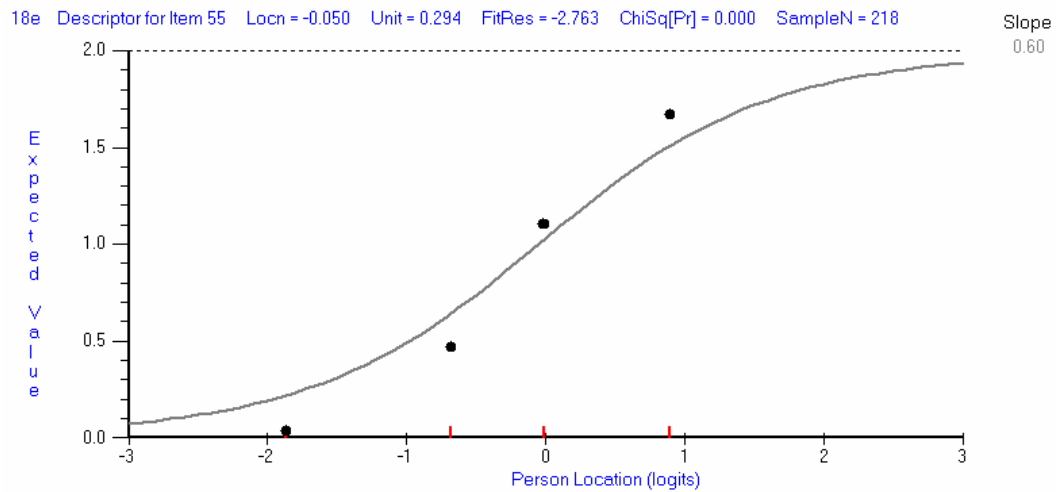
In summary, taking all pieces of evidence into account (the tests of fit and the ICCs) it is accepted that these items fit the model well, with the possible exception of Item 18e. This result is satisfactory because it is expected that approximately five percent of the items may not fit the model purely by chance. Therefore, it can be concluded that the Online Use scale forms a single continuum and thus it is legitimate to sum scores on these items and use these as measures for persons on this variable.

Targeting: Item/Person Distribution

The targeting of the items may impact on the overall validity and reliability of the instrument. One way to assess the targeting of the items is to examine the item/person distribution. The graph for the distribution of person and item threshold locations amongst all groups is shown below in Figure 5.13.

Figure 5.13 Person-item threshold distribution for the Online Use scale.
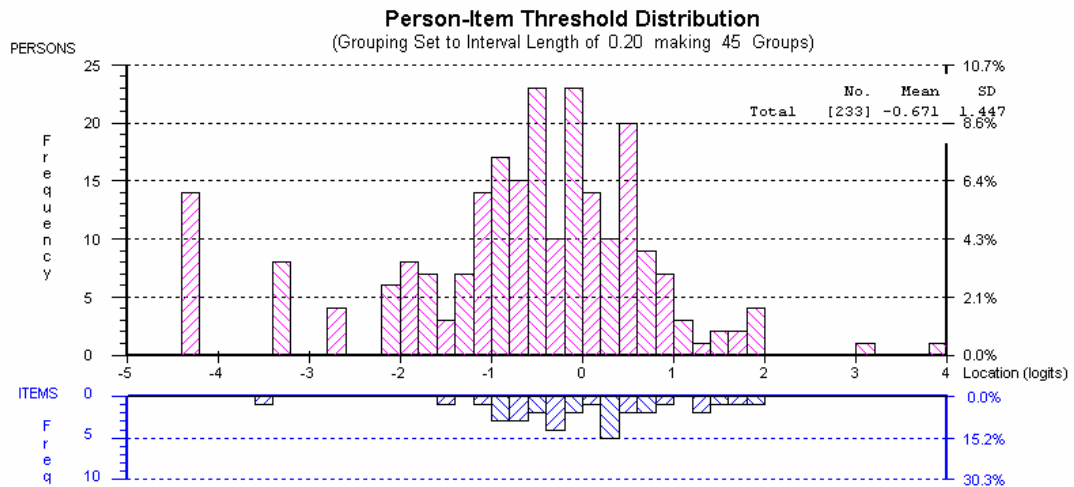
Figure 5.13 shows two histograms on the same logit scale. The upper histogram shows the person distribution and the lower histogram shows the item threshold distribution. On the lower histogram, the items located on the lower logit scale ranged from approximately -3.5 to +2. There was one very easy item threshold, shown at the lower end of the logit scale. The remaining item thresholds were relatively evenly distributed along the logit scale.

The upper histogram shows that the people are located between approximately -4.5 to +4 logits. There were a few outliers with a few people with low locations (low use of the technology) and a few people with very high locations (high use of the technology). The majority of persons were clustered between -1 to +1, indicating that they were fairly evenly distributed across the locations of most item thresholds. Because there were few items located at either extreme of the scale, very high use and very low use of the technology were not very well measured. Thus, the instrument would be improved if it included "more intense" and "less intense" items for future use.

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Order and Locations of Items

Analysis of the order and location of items in the OU scale was conducted to further examine the validity of the scale. Table 5.4 below shows the items in the Online Use scale in location order.

Table 5.4 Online Use items in order of increasing location (in logits).

Item	Item question and stem	Location	SE
16b	How often do you access the website to download the workshop questions?	-1.24	0.11
17b	How often do you use the PP presentations to take to lectures for note-taking?	-0.82	0.10
16d	How often do you access the website to download the PP presentations?	-0.81	0.10
17d	How often do you use the PP slides to review lecture content?	-0.75	0.10
23	How many times did you visit the website per week?	-0.52	0.11
18b	How often do you listen to the online lecture recordings as a backup?	-0.41	0.09
18f	How often do you listen to the online lecture recordings to review material prior to exams?	-0.34	0.10
18e	How often do you listen to the online lecture recordings in addition to reviewing notes/handouts?	-0.05	0.10
17c	How often do you use the PP slides to read while listening to the lecture audio recording?	0.04	0.10
17a	How often do you use the PP slides to link to my reading of the relevant chapters before attending the lecture?	0.15	0.11
18c	How often do you listen to the online lecture recordings instead of attending the live lectures?	0.35	0.11
24	How much time do you spend listening to the online lecture recordings per week?	0.36	0.11
18g	How often do you listen to the online lecture recordings instead of seeking assistance from the lecturer or tutor?	0.43	0.11
18a	How often do you listen to the online lecture recordings to review sections of the lecture after attending the live lecture?	0.89	0.12
18d	How often do you listen to the online lecture recordings instead of reviewing the notes/handouts?	1.22	0.12
16c	How often do you access the website to post a comment or question on the discussion board?	1.50	0.14

Viewing the items in location order (Table 5.4) shows that many participants endorsed Item 16b ("*How often do you access the website to download the workshop*

questions?"). Proportionately fewer participants reported that they posted a comment or question on the online discussion board (Item 16c). This ordering was as expected, in view of the theories of online learning which suggest that individuals are more likely to view educational technologies as a vehicle for the delivery of information rather than as a tool for online collaboration (see Chapter 3). The spread of item locations (-1.24 to 1.50) was a little narrow and suggests that less intense and more intense items could be added to the scale for future use.

Validity and Reliability: Conclusions from the Analysis

> ➢ All items except Item 23 operated better with three rather than 6 categories.
>
> ➢ Item locations were targeted reasonably well, but the inclusion of less intense and more intense items on the scale could be considered in future use.
>
> ➢ The overall fit to the model was good and the index of reliability (Person Separation Index) was 0.89.
>
> ➢ Overall, the items form a scale that can provide valid and reliable measures of the use of online resources (Online Use Scale).

Summary of Remaining Seven Scales

The reliability and validity of the remaining seven scales was assessed using the same analytical processes described above for the Online Use scale. These scales were: Motivation (MOT), Teaching and Learning (TL), Attitude to Online Learning (ATT), Online Use (OU), Administrative Use (ADMIN), Technical Factors (TF), Factors Affecting Use (FAU), and Experience with Technology (EXPT). The analyses

conducted on each scale are summarised in Table 5.5 and briefly discussed below.
Appendix XI gives a more detailed presentation of the results for each scale is presented
in.

Table 5.5 Summary of results from the eight scales in the questionnaire.

Scale	Items	Number of response categories	Reduced categories?	Items deleted?	PSI before collapsing categories	PSI after collapsing categories
MOT	10a-f	6	Yes	No	0.76	0.77
TL	11a-h, 13a-d, 14a-d	6	Yes	13d, 14d	0.48	0.60
ATT	12a-e, 13e,f, 14e,f, 15a-g, 19a-d, 20a-g, 21a-g, 22a-d, 25a-e, 29a,e, M15a-g M16a-f M17a-g M18a M23Ac-i, M30a-f	6	Yes	20d	0.89	0.91
OU	16b,c,d, 17a-d, 18a-g, 23, 24	6 4 (Item 23) 5 (Item 24)	Yes	No	0.93	0.89
ADMIN	16a, 21a, 29a, 29e, M30d,a	6	Yes	No	0.68	0.64
TF	20a,c,g, M23Ad, M17e	6	Yes	No	0.76	0.71
FAU	19a, 20e,f, 22a-d, M23Aa, M16d,e,f, M17f	6	Yes	No	0.79	0.76
ET	26a-d, 27a-d, 28	6 Item 28 – 2 categories	Yes	No	0.81	0.80

Motivation (MOT)

There were 6 items in the Motivation (MOT) scale. The ordering of the items on the Motivation (MOT) scale reflected a continuum of goals for learning, ranging from social motivations for attending university, to vocationally oriented motivations, through to more intellectual orientations for learning at university. Thus, a high score was taken to mean a greater level of self-motivation for learning (intellectually) at university.

Conclusions from analyses:

> ➢ Items 10b and 10c worked better with four rather than six categories.

> ➢ Item locations were fairly well-spread.

> ➢ PSI increased slightly from 0.76 to 0.77 after reducing the number of categories for Items 10b and 10c from 6 to 4 categories.

> ➢ The fit of the items to the model was satisfactory and thus the scale was accepted as a valid and reliable measure of students' motivation to learn at university.

Teaching and Learning (TL)

The Teaching and Learning (TL) scale included 16 Items that assessed the extent to which students' attitudes to teaching and learning were consistent with a student-centred approach to learning. Specifically, the TL scale examined three aspects of students' attitudes: the extent to which students' viewed their teachers as facilitators of learning or transmitters of knowledge; students' preferred learning environment; and, the desirability of collaborative learning. In this scale, a high total score indicated a greater presence of student-centred attitudes to teaching and learning.

Conclusions from the analysis:

> ➢ Thresholds between categories for Items 13a,b,c and Items 14a,b,c were ordered when response categories were reduced from six to three categories.

> ➢ Items 13d and 14d were eliminated because they did not fit the model. Omitting these items and reducing the categories improved the PSI reliability from 0.48 to 0.60.

> ➢ The PSI indicates that individuals were relatively similar to one another on this variable, thus reducing discrimination amongst them.

> ➢ The inclusion of less intense and more intense items on the scale could be considered in future use to discriminate amongst persons better.

> ➢ Overall the test-of-fit to the model was satisfactory, thus the scale was accepted as a valid and reliable measure of students' attitudes to teaching and learning.

Attitude to Online Learning (ATT)

The Attitude (ATT) scale was the largest of the eight scales in the questionnaire (81 Items) and assessed students' attitudes to online learning in higher education. A high score was taken to mean a positive attitude to using online resources for teaching and learning. After reviewing the CCC patterns, the threshold estimates and other tests of fit, all items in the Attitude scale were rescored from six categories to three or four categories.

Conclusions from the analysis:

> ➢ Item 20d was eliminated because it did not fit the model.

> ➢ Item 21b did not fit the model very well (low discrimination) but was retained because the thresholds were acceptable.

> ➢ Some thresholds remained a little disordered even after reducing the number of categories, but because the disordering was considered minor, the categories were not further reduced.

> ➢ Reducing the categories from six categories to three or four categories improved the PSI reliability from 0.89 to 0.91, indicating that it was worthwhile to reduce the categories.

> ➢ Overall, the scale had a high reliability and the criterion of fit to the model was satisfactory. Thus, the scale was accepted as a valid measure of attitudes to online learning. The reliability was not as high as the other scales but it is still acceptable.

Administrative Use (ADMIN)

The Administrative Use (ADMIN) scale had 6 Items and assessed the extent to which students used the online resources for administrative purposes (e.g. checking grades online). A high score indicated more frequent use of the technologies for administrative purposes. After reviewing the CCC patterns and threshold estimates, all the items were rescored from six categories to three or four categories.

Conclusions from the analysis:

> ➢ After reducing the number of categories, the disordered thresholds were ordered.

> ➢ Item fit was satisfactory.

> ➢ The PSI decreased slightly from 0.68 to 0.64 after collapsing the categories, however, this reliability was still considered acceptable.

> ➢ Overall, the reliability was a little low, indicating that persons were relatively similar to one another on this variable.

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> ➢ It may be worthwhile to extend the range of items in the future, but at present the scale was accepted as a valid and reliable measure of participants' use of the technology for administrative uses.

Technical Factors (TF)

There were 5 Items in the Technical Factors (TF) scale. A high score meant that students reported technical problems that constrained their use of the technology. After reviewing the CCC patterns and threshold estimates, all the items were rescored from six to four categories.

Conclusions from the analysis:

> ➢ Item 20c slightly overdiscriminated but was retained because the overdiscrimination was minor and the threshold estimates were generally ordered.

> ➢ After reducing the number of categories, the threshold estimates were acceptable.

> ➢ The PSI decreased slightly from 0.76 to 0.71 after the categories were collapsed.

> ➢ The scale fit the model and thus was accepted as a valid and reliable measure of participants' technical problems.

Factors Affecting Use (FAU)

There were 12 Items in the Factors Affecting Use (FAU) scale. A high score was taken to mean that students had many factors that promoted their use of the technologies (e.g. driving distance to campus; parking on campus; family/work commitments). Items were rescored to two, three and four categories on the basis of the CCC patterns.

Conclusions from the analysis:

> ➢ PSI decreased slightly from 0.79 to 0.76 after reducing the categories, but this reliability was still considered acceptable.

> ➢ M17f did not fit the model very well but was retained because results may have been biased by the small sample size (only Malaysian students completed this item).

> ➢ Overall test-of-fit to the model is satisfactory and therefore the scale was accepted as a valid and reliable measure of factors affecting use of technology.

Experience with Technology (ET)

There were 9 Items in the Experience with Technology (ET) scale. A high score referred to more experience with technology. On the basis of the CCC patterns, Items 27a-d were reduced to three categories and Item 26d was reduced to five categories. *Conclusions from the analysis*:

> ➢ After reducing the number categories, the PSI was reduced very slightly from 0.813 to 0.807 but still remained high.

> ➢ The scale was accepted as a valid and reliable measure of experience with technology.

Summary

The purpose of this chapter was to establish the face validity and reliability of the scales used to assess students' attitudes to and use of online technologies. A Likert-type rating scale was designed for the present study with two, five and six response categories for

different questions. Results from the analysis presented in this chapter clearly indicate that it would have been better to use three or four categories rather than six categories; results showed that respondents could not distinguish between all six categories. The PSIs on all of the scales were satisfactory even after the categories were reduced, so the reliability was minimally affected by reducing the number of response categories. Fewer than five-percent of the items on any one scale were eliminated because they did not fit the model. After elimination of the items, all eight scales satisfactorily fitted the Rasch model. Thus, it can be concluded that the items formed scales with equal intervals that operationalised single variables. In addition, qualitative evidence gleaned from the author's own experience and a review of the relevant literature confirmed the content validity of the questionnaire. Taking these factors together, the questionnaire can be said to have face validity in its capacity to appropriately measure students' attitudes to and use of online technologies.

Having established the validity and reliability of the scales designed for this study in the manner described above, the linearised person scores (i.e. logits) were used in standard statistical analyses to address the questions of interest in this study. The results of these statistical tests are reported in the next three chapters.

Chapter Six

Attitudes to the Nature of Technology and its Role in

Higher Education

> *Technological innovation will likely have the most far-reaching implications of all. . . . The revolution in information technology will provide unprecedented opportunities to change education itself. New ways to expand access and improve quality – and fundamentally rethink what should be learned and how – will become widely available at affordable costs.* (World Bank, 1999)

Introduction

This chapter is the first of three analyses that, when taken together, interrogate the World Bank's technocratic vision of innovative delivery as expressed in the ES99. The aim of this chapter was to firstly characterise and describe students' attitudes to the nature of technology and its role in higher education and secondly examine these attitudes in relation to the World Bank's assumption that technology is a necessary and positive component in higher education. To this end, I present the qualitative findings from interviews and focus groups conducted with 15 Australian, 18 Malaysian and 21 U.S. students (N=54) in relation to the first research question (*"What are students' attitudes to the nature of technology and its role in higher education?"*) and the fourth research question (*"What are the commonalities and differences between students' responses and the World Bank's policy on innovative delivery?"*). As explained in

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Chapter 4, the first research question was not examined quantitatively in the questionnaire items; instead, findings generated from students' responses to the open-ended items are presented. To further elucidate the issues raised by students, comments from the students' lecturers are also included in the discussion.

Literature on the philosophy of technology served as a framework for analysing and interpreting respondents'[8] statements. More specifically, Feenberg (1999) and Blacker and McKie's (2003) exposition of instrumental and substantive theories of technology were used by the author to characterise respondents' attitudes to the nature of technology and its role in higher education. Recall from Chapter 3 that instrumentalism and substantivism refers to a continuum of opposing views on the extent to which humans believe they can control technology and the nature of technological progress in society. Based primarily on the work of Feenberg (1999) and Blacker and Mckie (2003), attitudes to technology can thus be classified according to six theoretical categories, as summarised below in Table 6.1.

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[8] For simplicity, the term "respondents" is used to collectively describe the students and lecturers, and the terms "participants" or "students" are used to describe only the students.

Table 6.1 Definitions of instrumental and substantive attitudes to technology.

Theory	Definition
Instrumentalism	Technologies are tools that people use to achieve specific purposes; the technology is neither good nor bad but outcomes are determined by the way people use the technology.
Pro-Technology Instrumentalism	Technology will be used by people in positive ways.
Anti-Technology Instrumentalism	Technology will be used by people in destructive ways.
Substantivism	Technology has a value bias and is 'non-neutral'; the technology itself shapes society.
Pro-Technology Substantivism	Technology will shape society in positive ways (e.g. towards greater efficiency, societal progress).
Anti-Technology Substantivism	Technology will shape society in negative ways (e.g. will degrade society).

The interview questions were designed to elucidate students' attitudes to technology-mediated education according to the six categories listed above in Table 6.1. The respondents were asked a similar set of questions on a similar range of technologies which facilitated a comparison between respondents' attitudes and the World Bank's statements. The interview and focus group questions were used as prompts for discussion; answers to some questions were obtained as part of responses to other questions. Using N6 computer software, (Non-numerical Unstructured Data * Indexing Searching and Theorizing, version 6) the respondents' statements were coded under the relevant category node derived from Table 6.1, rather than under the specific question asked.

In general, respondents did not consistently assert either an instrumental or a substantive attitude throughout their interview. Some statements from the same students reflected two or more different categories. However, arranging responses within the instrumental/substantive dichotomy provided a useful framework from which to compare the differences and commonalities between the attitudes of respondents to those of the World Bank. To verify the accuracy of this qualitative analysis, a second coder independently coded twenty-five of the transcripts according to the coding manual developed by the author (see Appendix IX).

This chapter begins by discussing the findings that coincide with instrumental theories of technology. Next, I present the findings that reflect substantive theories of technology. At the end of each section, a summary of the findings across all three cultural groups is presented and discussed in relation to the World Bank's assumptions.

Instrumental Theories of Technology

Participants from all three cultural groups reported attitudes that coincided with instrumental theories of technology. Participants believed that the online resources were value-neutral in the sense that the technology was neither good nor bad in itself but determined by the way in which people used the technology. Among the instrumental attitudes reported, U.S. students reported more instrumental attitudes (48%) than Malaysian (27%) or Australian (24%) students. To take an example, one U.S. participant commented:

> *I can't really stress enough that there's nothing inherently good or bad about the technology, it's all about how the teachers use it and how the students respond to it and use it. . . . in the end it comes down to each individual student and*

professor to decide whether they are going to take advantage of it or whether they're going to not do so. (21 US/M)[9]

Similar views were expressed by Australian and Malaysian participants:

I guess I view technology just as a tool as something that should be taken for granted as being available when you study. I look at [our lecturer's] lectures and I think everybody should be doing this. . . . a good quality university will make sure that all of these tools are available to their students. As far as technology is concerned, it's another tool for me to achieve my goals. (15 AU/M)

[Technology] should not control you 100%, but in a way, aid you in achieving what you want. . . . It's up to you to use it in a way that works for you. (10,11 MA/F)[10]

These perspectives coincide with Feenberg (1991), who explained that instrumentalism is a "common sense" attitude that regards technologies as "tools" that are available to serve their users. According to instrumentalism, if technology has negative consequences, it is not the fault of the technology *per se,* but that people have used the technology inappropriately. Winner (1977) put it in a different way:

Technology is nothing more than a tool. What men do with tools, of course, is to "use" them. The tool itself is completely neutral, a means to a desired end. Whether the end accomplished is wise or unwise, beautiful or hideous, beneficial or harmful, must be determined independently of the instrument employed. (p. 27)

The potential for inappropriate use of technology was mentioned by participants:

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[9] Quotes from interview transcripts are coded according to the participant number, the country from which they were interviewed and their gender.

[10] As previously mentioned in Chapter 4, Malaysian students were interviewed in pairs or focus groups. During these interviews, the researcher noted the students who expressed agreement with another participants' comment or statement. These observations are shown by listing the number of participants in the focus group who agreed with the statement.

I think technology is a two-sided thing and it depends on how you use it. (20 US/F)

[Technology] can be either/or – I mean overall it's beneficial for students . . . but it can also have a dark side. (10 US/F)

The role of humans in directing the outcome of technology was developed by Winner (1977) who wrote: "The new [technological] devices, regardless of their size and complexity, are still tools that may be used either well or poorly" (p. 27). Winner's comments were illustrated by another U.S. participant:

Technology always helps students but sometimes it's the way students use it too. If you use it in a way that it's not supposed to be used, then it's going to hurt you more. But if you use it in the way that you should, then it totally helps you. (2 US/F)

With respect to educational outcomes, one could infer that within an instrumentalist framework students would be capable of deciding how and when to use the technologies to benefit their learning. For example, an Australian participant believed that a good student was characterised by their use of the technologies:

[W]hether they use [the technology] would determine whether or not they are a good student. (13 AU/M)

Interviews with the students' lecturers revealed that the lecturers also held instrumental attitudes. For example, the Australian lecturer commented:

[W]ith all these things there's the potential for good and for bad. Unthoughtful use of the new information technologies makes it a highly spoon-fed environment. (L5 AU/M)[11]

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[11] Quotes from interviews with the lecturers are coded according to the lecturer number, the country from which they were interviewed and their gender.

Similarly, one Malaysian lecturer implied that online technologies could be detrimental, depending on how they are used:

> *I think the online technologies are useful . . . But when you teach you still need the personal touch, so I see it as a supplementary tool.* (L3 MA/F)

The U.S. lecturer commented on the usefulness of technology, but once again, emphasised that any potential gain was dependent on the discernment of the individual user:

> *[T]here's a lot of good stuff and there's a lot of bad stuff out there [online], and so as you teach students the hallmarks of how to recognise the quality information, you can utilise technology for skill building exercises and things of that nature.* (L4 US/F)

Common to the above statements is an emphasis on individual and collective human agency. Respondents viewed the technology as under human control and people must exercise discernment in order to achieve a desired (positive) outcome. This attitude is typical of the instrumental theory, which Winner (1977) described as, "men know best what they themselves have made; that the things men make are under their firm control" (p. 25).

The importance of human control over technology was clearly expressed by one U.S. participant, who argued that technology was beneficial for those who can make the technology "work":

> *I think at this point it's just a thing. It has the potential to remain as just a thing, and it has the potential to be something really great if we can just make online technology work and make it benefit education, but it also has the potential to ruin everything and be a horrible thing and just encourage laziness . . . Time*

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will tell. But as of right now it can really go either way and it's definitely not a bad thing right now. (21 US/M)

Some students believed that technologies have always existed, simply to extend the capacities of individuals, for good or bad. This view was illustrated in the comments by one U.S. participant:

I think people my age don't really see it as a gift, as if it's always been there . . . For me it feels like it's always been there but I vaguely remember the time when I didn't have e-mail and when I would talk to people on the phone and not on instant messenger. So it's taken for granted. . . . I do everything on the screen, I don't even print out to edit, that's just the way it's supposed to be – it's natural. And I'm sure that's the way a lot of people think right now. (17 US/M)

Relatedly, other students seemed to take the technologies for granted, which once again, illustrates the individual human agency as the benchmark by which the value of technology is assessed.

[Technology] becomes a given – it's probably replaced the old-style way of learning so that at first it's like "Wow, we have this, we have that" and people say "Oh, this is interesting," but then after awhile they get used to it . . . it's not exciting anymore it's just a part of learning and part of how it is, that's the way they know it. (12 US/M)

A similar attitude was evident when participants compared technology-mediated learning to conventional methods of learning. One participant commented that online resources:

[A]re no different except that you're saving a tree. (9 AU/F)

And another participant commented that:

[Online resources] save a lot of paper with photocopy machines. (17 US/M)

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The discussion so far highlights the emphasis given to human control over technology. Almost half of the instrumental comments were reported by U.S. students (48%); however respondents from all three cultural contexts believed that the online resources were tools that could be used at their (rational) disposal, for good or bad purposes. Some students had become so accustomed to using the technology that they did not recognise the broader impact of technology on education.

Pro-Technology Instrumentalism

Theories concerning pro-technology instrumentalism state that people have both the capacity and intention to use technologies in positive and beneficial ways. Respondents in all three countries reported a variety of ways in which educational technologies could be used in positive ways. Statements in this category were classified by the researcher into three categories relating to the positive benefits of online learning: convenience and efficiency, access to information, and independent learning. These categories are briefly discussed below.

Convenience and efficiency

Many students commented that using online technologies made their learning more efficient and convenient. This attitude was most commonly reported by U.S. students (54%) and less commonly reported by Australian (27%) and Malaysian students (19%). To take one example, a U.S. participant commented:

> *It's nice to know it's there if I have any questions and you know the information is there and I don't have to e-mail or run around to find it – I can just go and look on my own at any time of the day.* (7 US/F)

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Australian students also commented on the flexibility and convenience that online technologies facilitated. For example:

> *Students have more choice in the way that they want to do research and more choice in whether they go to lectures or not – more personal freedom. And also I had a unit clash this semester so I was running from one lecture to another and then back to the original lecture. In the hour in between classes I could catch up on the internet.* (13 AU/M)

Similarly, two Malaysian students stated:

> *Yes, [the online resources] can help us in certain ways. For example, . . . [if] we are late for class and we miss the lecture. So referring back to the online resources is a good way to catch up, so I think that it definitely helps.* (10,11 MA/F)

> *When you have home access it's so easy – you can do it anytime. You don't spend so much time being in college trying to get a place in the computer lab and not get kicked out by a teacher who is using it in class. So when you have access at home – it's so easy – you can do it anytime.* (12 MA/F)

The Malaysian lecturers were also supportive of the convenience afforded by the technologies, as illustrated below:

> *I think the benefit is for the students – they can get the resources any time, anywhere.* (L3 MA/F)

The fact that in this category the overall proportion of comments from Malaysian students was lower than the other two countries may be due to other factors, such as a slow download speed and lack of internet facilities. These factors are discussed in detail in Chapter 7. U.S. participants may have viewed the technology as facilitating greater efficiency and convenience because Western countries have typically valued efficiency and, as Marx (1987) put it, "the technocratic concept of progress" (para. 23).

In addition, U.S. students benefited from the faster internet access and downloading speed on campus. These factors may have contributed to the greater proportion of attitudes reported by U.S., and to a lesser extent, by Australian students.

Access to information

Participants from all three cultural groups commented that the online resources gave them better access to information. Comments by Malaysian students (53%) were most frequently reported in this category. For example, two Malaysian students commented:

> *It improves [the quality of education] because at least we can find more resources other than what the College provides us.* (8,9 MA/F)

Other Malaysian students reported that technology opened up new opportunities for learning:

> *[B]y having IT, I think it has opened more windows to education – you can learn anything from the Internet. You can learn from your house, you don't have to go to the universities, you can just learn at home.* (10,11 MA/F)

The Malaysian lecturers were similarly positive about the potential of online resources to enhance student learning. One lecturer commented that online resources can provide additional information for students when existing resources are limited:

> *[I]t is better for them to look at the website. Students can gain more information than otherwise.* (L1 MA/M)

Less than a third of U.S. students (27%) reported that the technologies facilitated better access to information. Among those who commented, U.S. students spoke favourably about the internationalisation of education, as illustrated below:

[I]f we can use technology to be internationally and globally connected in the future when everyone may be more technologically advanced, it will promote dialogue with people in other nations and I hope to see if we can have lectures from professors in China and Europe and Russia. (13 US/F)

Respondents also pointed out that the online resources were useful in acquiring the knowledge and skills necessary for future jobs. For example, one U.S. participant said:

If companies are going to be technologically advanced, then I can transfer these [technological] skills . . . the method of work is going to be similar. (14 US/M)

A small number of Australian students (20%) commented that the online resources facilitated better access to education, as illustrated in the following two quotes:

It's a fantastic resource. I wouldn't be able to study if this flexible study option wasn't available. (230 AU/F)[12]

[W]ith this new technology everyone is sharing the knowledge around these days and information is being able to flow freely. So if people are aware there is all this information around and they know how to access it, they can gain contact with people to solve problems and I think that's pretty helpful. (7 AU/M)

Overall, these comments illustrate the instrumental belief that people can control technology and use the technology for productive and beneficial purposes. However, note that the proportion of responses presented in this section contrasts with the findings presented in the previous section on convenience and efficiency. U.S. students were more likely to comment on the convenience of the technology, whereas Malaysian students viewed the technologies as a tool for increasing access to information.

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[12] Reference numbers that are larger than 20 refer to statements gleaned from the open-ended statements in the questionnaire.

Independent learning

Some students reported that the online resources allowed them to take more responsibility for their own learning and learn more independently. Among the comments in this category, more than half of the statements were from Malaysian students (53%). For example, two Malaysian participants commented:

> *I think technology is good – everybody can study alone and you go and search for things yourself. I think it depends on the individual.* (17,18 MA/F)

Other Malaysian students mentioned similar ideas:

> *[The online resources] give us responsibility to go and find [out]. . . Instead of relying on the lecturer, it builds our independence.* (12-16 MA/M,F)

> *[B]y having the online resources I think it's good for students to actually keep track of their studies in that subject because if they don't put in effort to keep track of what is happening to their performance, they won't know what's going on – they will actually depend on the lecturer to tell them what's going on – but they have to take responsibility, taking action in knowing what's going on – "How far, or how should I improve".* (10,11 MA/F)

This trend is noteworthy, because as explained in Chapter 3, scholars have suggested that much of South East Asian education is dominated by "spoon-feeding" and "rote-learning", with few examples of independent learning (see for example, Ziguras, 2001). The comments presented here indicate that some Malaysian students may be moving away from teaching and learning practices that traditionally were teacher-centred.

About a third of Australian students (31%) and only a few U.S. students (16%) commented on the role of technology in facilitating independent learning. For example, an Australian participant commented that the online resources increased the teachers' feedback on his learning:

[I]t's like there's more feedback, you actually know how you're going. So you know whether to do more of an effort or whether I'm bad at this, or whether I need any more study here. . . . It's the feedback, it lets people know where they are. (11 AU/M)

Other students believed that the technologies were beneficial because of the independence the technology facilitated. For example, one U.S. student commented:

I think a lot of [students] really like the webcast because it means that they don't have to go to lecture. . . . I think that technology allows them to delve into it as much or as little as they want so it allows them to be more independent and I think they're very enthusiastic about having that independence. (10 US/F)

The U.S. lecturer also mentioned that the technologies gave students more options in obtaining unit information:

[T]hey can integrate [the technology] into their situation and make the best use of the time and their resources based on that. (L4 US/F)

Like the majority of her peers, a U.S. participant admitted that her enthusiasm for greater independence was not motivated by the prospect of better learning outcomes, but by the desire for individual choice:

[S]ome people might prefer going to lecture like me – that is, some people might prefer just waking up and sitting in front of the computer and watching the webcast. . . . I guess having choice is a good thing. (8 US/F)

Similar views were expressed by another U.S. student:

Sometimes I feel that there's no need to seek other people because if everything is online, you're just wasting their time. (6 US/F)

In summary, it appears that the availability of online resources may foster an increased level of independent learning among Malaysian students. This may indicate a change in educational traditions, where students are moving away from their reliance on teacher-

centred education and becoming more independent in their learning. This method of learning may be new to Malaysian students, which might explain the high proportion of comments in this category when compared with the Australian and U.S. students.

Anti-Technology Instrumentalism

Students across all three cultural groups reported a variety of ways in which the online technologies were used in negative and detrimental ways. In this category, the U.S. students were the most critical (67%), followed by Australian (24%) and Malaysian (9%) students. For example, some U.S. participants were concerned that students were becoming lazy:

> *I think the webcasts keep students from going to lectures . . . I notice that a lot of people are saying, "I won't go to class, I'll just watch it on the webcast later". So I don't know if it's making people lazy – if it works for them, then more power to them, but overall I don't know how successful it is . . . it probably has made them not want to go to lecture as often.* (12 US/M)

Other U.S. students were concerned that the technology encouraged the lecturers to become lazy:

> *[T]echnology is kind of being used as an excuse to not have live lectures, to not be as organised for lectures as a professor could be.* (4 US/M)

Students also raised concerns about other aspects of the educational experience. For example, an Australian participant was concerned that university culture was at risk:

> *Students always use the Internet to find information so they probably don't use libraries as much as they did a few years ago. Students are more independent – maybe that could be detrimental because students aren't coming into libraries, so it might destroy some culture because they wouldn't be on campus as much as they used to.* (13 AU/M)

A few Malaysian participants also reported similar concerns:

> *In a way, it would encourage the students to not come to class because "OK, if I don't come, there is always something to fall back on".* (10,11 MA/F)

U.S. students believed that technologies were used to create a distance between students and lecturers:

> *I think that students should do everything they possibly can to learn including getting to know the professor and . . . I'm not really doing that much anymore.* (3 US/F)

> *The biggest concern is the distance – when humans start separating themselves and confine themselves to their own house and their computer and their refrigerator is their world. We're social creatures.* (17 US/M)

Relatedly, other U.S. students felt that the campus culture of their institution was at odds with the values embedded in technological advancement. For example, one student commented:

> *I think [our university] is probably the least accepting of this technology because – I don't know what you call it . . . I don't follow a lot of these ideals – but people are against globalisation, they're against corporate America, they're against a lot of this melting pot type stuff. People really want to be individual and unique; they don't want to have their number stamped online somewhere and I think people, well these people generally stay away from computers as well. So I think [our university] culture is one of the least accepting of it . . . There's a stronger minority of people who would not like it, that's what I'm trying to say.* (19 US/M)

Furthermore, U.S. students were critical of the increased competition that resulted from using the technology. For example:

> *[S]ome of the negatives can be where the competition aspect is directly online. You can walk away from a section or a lecture and be free from the competition at least for a week. But online it's always there, especially if you're on e-mail lists – it's a constant reminder that I should be working really hard to do better*

than everyone else. Trying to stay away from the emphasis online at least that you need to compete against everyone else. (19 US/M)

Interviews with the lecturers revealed similar criticisms concerning the way that technology was being used. For example, the U.S. lecturer disapproved of students using the technology instead of traditional resources, which in her view, created a distance between the lecturer and the student:

> *[Students] want to use the computer, they don't have to go to lecture if we have webcast, so there's the potential for a lot less lecturer-student interfacing on a human level – I mean physical presence.* (L4 US/F)

Similarly, Malaysian lecturers were concerned that the use of technologies may reduce face-to-face interaction:

> *The only snag about online resources is [the students] tend not to come for classes – you don't see them. That is the disadvantage. It's left up to them to do the work at home.* (L3 MA/F)

It is worth noting that only a few Malaysian students criticised the use of technology (9%), as compared to the U.S. students (67%). This may be because Malaysian students had not used the online resources for as long as the U.S. students and perhaps had less time to be exposed to potential negative outcomes.

Summary of Instrumental Attitudes

The attitudes reported by students and lecturers were classified by the author into three general categories: instrumental attitudes, pro-technology instrumental attitudes and anti-technology instrumental attitudes. The proportion of attitudes reported by

participants are summarised in Figure 6.1 below and briefly discussed in relation to the

World Bank's aims for innovative delivery.

Figure 6.1 Proportion of statements by students that reflected instrumental attitudes to technology.
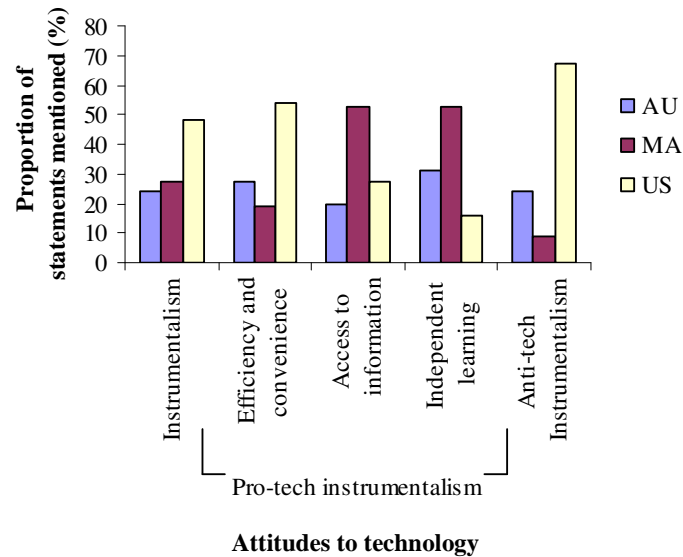
Overall, instrumental attitudes were most commonly reported by U.S. students,

followed by Malaysian and Australian students. U.S. students in particular emphasised

the role of human agency and the capacity of people to use technology for both good

and bad purposes. The fact that all three cultural groups mentioned instrumental

attitudes contrasts the World Bank's description of innovative delivery. The Bank does

not suggest that technology could be good or bad depending on how it is used, but

instead appears to focus only on the positive outcomes and potential role of online

resources in education.

In the category on pro-technology instrumental attitudes, participants tended to

comment on three components of the online resources which they believed could be

used and controlled to benefit their learning. The U.S. students were most optimistic about the greater efficiency and convenience afforded by the technology, whereas Malaysian students were most positive about the greater access to information and their ability to learn independently. Providing additional resources for students is a major goal of the World Bank's vision for innovative delivery, and the Bank clearly emphasises the practical benefits of efficiency, convenience and flexibility (World Bank, 1999 p.2). The optimism of this view centres on the idea that using the technology will bring progress and educational advancement, which fits well with the general theory of instrumentalism. However, the extent to which these aims actually translate into practice will be explored in Chapter 7.

A number of students expressed concerns about the use of technology, described in the category on anti-technology instrumentalism. In particular, the U.S. students emphasised several ways in which technology could be used for negative and detrimental purposes in education. The World Bank does not explicitly refer to existing or potential problems involved with the use of technologies. This is in keeping with the Bank's technological determinist position in the sense that technology is assumed to be unproblematic. Thus, the anti-technology instrumental views from all three cultural groups presented in this section did not coincide with the optimism of the World Bank's claims for innovative delivery.

Substantive Theories of Technology

As noted in Chapter 3 and at the beginning of this chapter, substantive theorists claim that technology is not necessarily controlled by people, but that the technology itself

shapes society and individuals to serve the requirements of the (almost autonomous) technological system. Substantive theorists, such as Jacques Ellul, claimed that *la technique* was an all-embracing evil power that enslaved people (Ellul, 1973). This theory asserts that technology is deeply embedded in our culture and it determines many aspects of educational practice. In this perspective, the infusion of educational technologies is necessarily inevitable and unavoidable (Blacker and McKie, 2003).

Students in all three cultural groups reported substantive attitudes, most commonly referred to by Malaysian (42%) and U.S. (37%) students and less commonly by Australian students (21%). Malaysian students offered responses much like the rhetoric in advertisements for computers. For example:

> *In order for you to actually move forward I think you need to include IT as part of your life, by hook or by crook you have to accept IT as a way of life.* (10,11 MA/F)

> *[S]ome people do prefer the traditional way of conventional study, but you still need to accept it [the technology].* (10,11 MA/F)

In a similar vein, U.S. students commented:

> *I think it's something that's there and there to stay. It makes our lives more convenient.* (15 US/F)

> *[O]verall I don't think you can stop it from coming. So I think it would just depend on how long it takes to accept it.* (12 US/F)

Australian participants also expressed substantive attitudes:

> *[C]omputers are going to become more and more a part of our lives whether we like it or not.* (3 AU/M)

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Another Australian participant commented that a knowledge of computers was essential for her future employment opportunities:

> *Having to use resources like technology makes you learn about the technology. So I've had to learn an awful lot about computers over the last two years. It forces you to go and get some assistance and learn something which obviously employers are going to want, since computers are taking over the world.* (12 AU/F)

The attitudes illustrated here contrast with the emphasis on human agency outlined in the previous section on instrumentalism. Where instrumental theory places responsibility on individuals to use the technology for positive and beneficial purposes, substantive theory places responsibility on individuals to adapt to the changes imposed by a technological society without necessarily questioning its presence. According to substantivism, students must adapt to the demands of acquiring technical knowledge and skills. For example, one Australian participant commented:

> *Kids are practically getting born under computers. Like if you go to a preschool . . . they've got computers right there. Fisher and Price now have "My Little Computer" for little babies – we are in the world of computers . . . it's just the way the world is going.* (11 AU/M)

Similarly, a U.S. participant said:

> *[I]n jobs nowadays, it's like "do you have computer skills". It's become essential to have those skills now and so I like these [online resources] because that's basically what it does.* (1 US/F)

Participants believed that they were required to learn how to use the online resources because technological knowledge is:

> *[D]efinitely a plus and definitely necessary in the 21st century.* (8 US/F)

Students viewed technology as an essential part of life, and some even seemed to disapprove of those students who were not technologically savvy. This was illustrated by one U.S. participant:

> *If you ask any student and they don't have an e-mail address, they're kind of weird. They're kind of funny people.* (19 US/M)

Interviews with the students' lecturers also revealed substantive attitudes. In particular, the Malaysian lecturers commented on the inevitability of the infusion of technologies into education. As one lecturer said:

> *[T]he government plays a very central role in introducing technology [to education]. . . So the trend has already been set, now it is a matter of time.* (L1 MA/M)

Another Malaysian lecturer pointed out that:

> *[S]ooner or later we will also have to use online resources to teach. . . to be in-tune with the current trends.* (L3 MA/F)

Although the infusion of technology was seen by many respondents as inevitable and unavoidable, not all participants saw this as positive or beneficial. One U.S. participant commented on the difficulty of adapting to continual technological change:

> *I feel that I have to accept and adapt to the changing world. That's something I'm kind of stubborn about – I want the book, I want to go to class, but it's a new thing that is really helpful, that could be really helpful if you let it.* (6 US/F)

She went on say that:

> *I guess change is always hard. It could be like a shock – having to change and having to adapt to other stuff, it's kind of like a disturbance. But then the disturbance is for the better, I feel like I'll get through this stage fast because I won't be in this stage for long, I'll try it out [the online resources] and see how beneficial it is for me.* (6 US/F)

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In a similar vein, another U.S. participant was concerned about needing the technological skills to survive in the modern age, even if it conflicted with her preferred learning style:

> *[T]echnology is a huge thing especially because when I came here [to university] I knew nothing about technology – I'm really a pen and paper kind of person. But if you don't have the basic computer skills, you're kind of lost.* (5 US/F)

These comments indicate that even in the U.S., where students purportedly had the most experience with technology, there were some students who had difficulty adapting to the use of technology. Malaysian students were more inclined to view the technology from a substantive perspective than Australian or U.S. students.

Pro-Technology Substantivism

Theories of pro-technology substantivism assert that technology shapes society toward greater progress and efficiency. As O'Sullivan (2000) put it, substantive theorists argue, "why would people develop technologies that were not intended to bring improvements?" (p. 54). The largest proportion of substantive attitudes were reported by U.S. students (70%), followed by Australian (27%) and Malaysian (3%) students. For example, one U.S. participant commented:

> *Who wouldn't want something extra to help you out in your learning or have the resources available? I can't see how it will be detrimental to higher learning.* (6 US/F)

The U.S. lecturer expressed similar substantive views:

There's no question that the technology is an enhancement. I mean, how could it not be, really. (L4 US/F)

U.S. participants commented that the technology opened up new learning opportunities. For example:

> *[I]n class [the lecturer] will give you additional web site links and you'll go to learn about other things on the subject. So in that way it opens my mind to a lot more things.* (3 US/F)

Similarly, some Malaysian students believed that the technology opened new ways to obtain information:

> *Our technology is expanding to a great level, therefore we require [the resources] to get information as easily as possible.* (61 MA/F)

Participants across all three cultural groups commented on the increased efficiency facilitated by the technologies. Greater efficiency was viewed optimistically, particularly by U.S. students:

> *I think [the technology] has made things a lot easier and a lot more efficient . . . And I'm kind of excited to see what they'll come up with next.* (7 US/F)

> *Out with the old and in with the new. . . I don't believe in holding on to antiquated approaches that may not be efficient. I'm all about efficiency and I see the technology as very efficient.* (19 US/M)

Australian participants were also enthusiastic about the increased efficiency, as expressed by the following participant:

> *[A]s a student I would definitely encourage it . . . . It just makes it easier, it gives feedback, it gives everything, to not just one student but to all the students, so it's easier on the lecturer as well, much easier.* (11 AU/M)

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Anti-Technology Substantivism

Anti-technology substantivist theories assert that technology is an autonomous entity that can impact society in negative ways. This theory ascribes little power to people's control of technology and their capacity to use it for good. Among those comments in this category, this view was most commonly reported by U.S. students (80%). A minority of Australian students (20%) and no Malaysian students (0%) reported anti-technology substantivist attitudes. The lack of critical comments by Malaysian students is similar to the trends identified in the section on anti-technology instrumentalism, where only a small proportion of Malaysian students (9%) were critical of the technology.

Among the U.S. participants who offered critical comments, one student captured the essence of this position, implying that technology is potentially "uncontrollable":

> *[M]y only concern is if there's a big bug going through, I wouldn't want it to stop the class from happening. That's one of those reasons why I'm scared of computers – if there's a big bug and all the computers shut down, then do we have a backup to rely on? . . . if there's a huge virus that is uncontrollable and it wipes out all the computers . . . how are we going to know what's going on – that's my fear.* (11 US/F)

Many respondents gave examples about the negative impact of technology on social and cultural patterns. To take one example, a U.S. participant said:

> *The problem with the internet and such is it's creating our social life in a room away from everybody.* (17 US/M)

Other students believed that their education should primarily involve face-to-face instruction, rather than computer-based instruction:

Sometimes I feel that you pay so much money to go to [university] and if you get your education from the computer, then kind of what's the point? And I think a lot of learning is actually going out and experiencing it. (7 US/F)

Students were particularly concerned that technologies created a distance between the teacher and student, altering the quality of the educational experience and making learning: *"[S]lightly less face-on"* (12 AU/F). In addition, some participants questioned the assumption that technology always brings educational improvement and progress. As one U.S. participant commented:

I see [technology] taking over a lot of things. I usually see bad things actually. . . . It's not as intimate anymore and I don't really like that – I don't really like sitting behind my computer and doing everything based on that without having someone actually there. . . . I don't want my teacher to be my computer. . . . I don't want teachers to rely so much on technology and feel like it 'if only you looked it up then you would have been able to do better'. I just don't like that because I feel like it's making teachers more irresponsible I guess, or they just don't care as much for their students anymore. I don't like that either. (2 US/F)

Participants were critical of technology's influence on teaching practice. For example, one U.S. participant noted that:

[Professors] will just put up a bunch of these [online] resources and then give exams, as opposed to professors trying to teach their students and trying hard to give each student an education. So I would just worry that it would make universities lazy. (4 US/M)

Other students were concerned that technology could make students lazy:

I think technology makes life more convenient – but then what's convenient, like the remote control and the car – it makes life faster and more convenient but then we rely more on technology than on ourselves and so we do less ourselves and make other things do things for us. So in that sense it kind of makes us lazy in that it puts fewer burdens on us . . . we can take the pressure and burdens off ourselves. (12 US/M)

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The U.S. lecturer held similar views to that of her students with respect to technology creating a distance between students and lecturers. She argued that:

> *I think the ability, the skills for social interaction, intellectual discourse, things like this are really important and they are also part of the fun and I think that it can be – for those who tend to be uncomfortable [with online learning] – perhaps it is a disadvantage in that they have a way for even less development of their people skills, if you will.* (L4 US/F)

These views coincide with Bowers' (1988) opinion on technologies, who argued that, "[T]he technocratic mind-set privileges experimental innovation over substantive traditions, abstract and theoretical ways of thinking over implicit forms of understanding, the autonomous individual over the collective memory and interdependence of the cultural group, and a reductionist, materialistic view of reality" (p. 9).

Summary of Substantive Attitudes

The substantive attitudes reported by participants are summarised in Figure 6.2 below and briefly discussed in relation to the World Bank's aims for innovative delivery.

Figure 6.2 Proportion of statements by students that reflected substantive attitudes to technology.
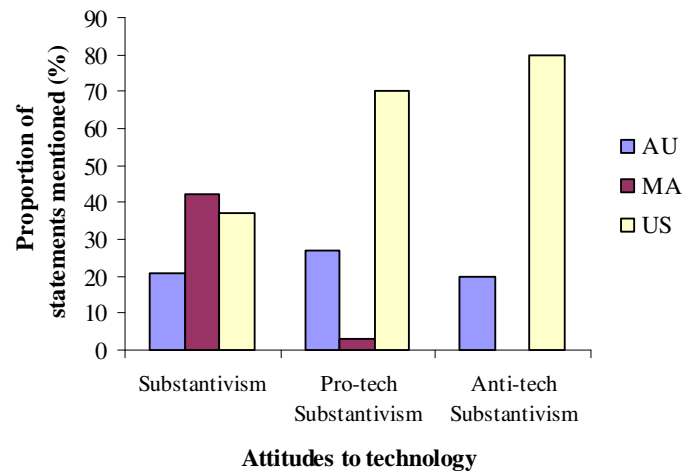
Figure 6.2 shows that Malaysian students reported the greatest proportion of substantive attitudes, when compared with U.S. and Australian students. Although the proportion of substantive attitudes reported by Malaysian students was only a little higher than the other two cultural contexts, it could be argued that this trend is consistent with the literature outlined in Chapter 3. Although there were some exceptions in that some U.S. students also believed that they had to adapt to the technology and accept it, the greater proportion of comments were mentioned by Malaysians, indicating that these students are more inclined to believe that technology has a "substantive" impact and they need to adapt to the technology.

Substantive perspectives are well aligned with the views of the World Bank. For example, the ES99 refers to the technological imperative, cautioning that those who do not respond will not progress (technologically) and "risk falling behind". The World Bank argued that, "Without vigorous efforts, global and national gaps in education, opportunities and outcomes could widen much more" (World Bank, 1999 p. vi). And

further, the Bank stated that "The long-term goal for education . . . [is] to ensure that all people everywhere have the opportunity to . . . acquire essential skills to survive and thrive in a globalising economy" (World Bank, 1999 p. 6).

In the category of pro-technology substantive attitudes, the U.S. students reported the most number of comments. Only a few Malaysian students and a minority of Australian students reported that the technology was shaping education in beneficial ways. The attitudes of the U.S. students coincide well with those of the World Bank in that investments in technological innovation are made on the assumption that technology will shape education in positive ways:

> Technological innovation will likely have the most far-reaching implications of all. The new technological advances of the years ahead will facilitate some of the other developments – e.g. by providing people with virtually unlimited access to information. (World Bank, 1999 p. 2)

A large proportion of U.S. students reported anti-technology substantive attitudes. As noted earlier, the ES99 indicates that technological innovation will always produce positive change. In this sense, the attitudes reported by U.S. and Australian students do not coincide with those of the World Bank.

Summary

This chapter characterised and described students' attitudes to the nature of technology and its role in higher education. Students' and lecturers' attitudes from three different cultural contexts were discussed in relation to the assumptions embedded in the World Bank's policy documents on technology-mediated education. As we have seen, participants reported a range of instrumental and substantive attitudes toward

technology, which included both positive and negative aspects of its use in higher education. These trends are summarised in Figure 6.3 below.

Figure 6.3 Proportion of statements by students reflecting instrumental and substantive attitudes to technology.
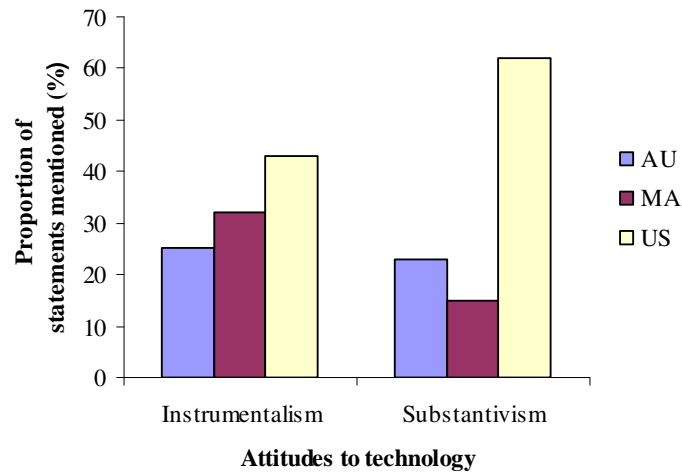
Overall, U.S. students reported a greater proportion of instrumental and substantive attitudes than Australian or Malaysian students. The proportion of substantive attitudes reported by U.S. students was markedly higher than those reported by Australian or Malaysian students. The analysis presented here indicates that participants' attitudes were only partially consistent with the World Bank. In particular, the anti-instrumental and anti-substantive attitudes contrasted with the Bank's optimism for technology-mediated education. Other attitudes, such as the 'inevitability' of technological development and the greater efficiency facilitated by the technology coincided with the World Bank's technological determinist position.

In the next chapter, I explore a second assumption put forward by the World Bank concerning the potential of educational technologies to expand access and increase

educational opportunities by examining the factors that influenced students' use of the

online resources.

Chapter Seven

Innovative Delivery: Overcoming Existing Barriers to Education?

The revolution in information technology will provide unprecedented opportunities to change education itself . . . [by] overcoming the existing barriers of declining budgets, too few faculty, outdated equipment, and limited space and facilities that prevent increased access to higher education. (World Bank, 1999 p. 2)

Introduction

A central assumption put forward by the World Bank is that innovative delivery can contribute to overcoming existing barriers to education (World Bank, 1999). In this chapter, I examine this claim through the perspectives of students and their lecturers in Australia, Malaysia and the United States. More specifically, I report the findings on the factors that influenced respondents' use of the online resources employed in the units of study at their university. Identifying the factors that influence or constrain students' use of online resources may give insight into the potential of innovative delivery to overcome existing barriers to education.

To begin, I present the quantitative findings generated from 55 Australian, 52 Malaysian and 65 U.S.[13] students' responses to the questionnaire designed for the present study. Having established the validity and reliability of the questionnaire by using the Rasch measurement model (see Chapter 5), the linearised scores (logits) were used in standard statistical analyses. The findings from these analyses are reported in this chapter.

Next, I present the findings from the qualitative data based on the interviews and focus groups conducted with students from the selected cultural groups (N=54). Where relevant, comments from the students' lecturers are included in the discussion to further clarify and explain the issues raised by students. To conclude this chapter, I discuss the findings in relation to the assumptions embedded in the World Bank's policy on innovative delivery.

Findings from the Scales on Factors Influencing Use

The questionnaire used in the present study was designed to examine students' attitudes to and use of online resources. Of the eight scales included in the questionnaire, three scales examined the factors that influenced students' use of the technologies: Technical Factors (TF), Factors Affecting Use (FAU) (e.g. lack of available computers), and Experience with Technology (ET). This chapter reports the findings from these three scales. The outputs from each scale, referred to as person location scores (in logits)

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[13] As mentioned in Chapter 4, a sample of 65 questionnaires from the U.S. respondents was randomly selected from the original 126 questionnaires and used in the statistical analyses so that the findings were not biased in favour of the U.S. because of a larger original sample.

were entered into SPSS v. 12.0.1 software for further statistical analyses (SPSS, 2003). The aim of these analyses was to determine whether there were statistically significant differences on each of the scales amongst the three cultural groups.

The factors that influenced students' use of the educational technologies were classified by the author as either *external constraints* or *internal constraints*. For the purposes of the discussion presented here, external constraints were regarded as factors that existed independently of the students, such as technical issues and internet access. Internal constraints were regarded as factors that hindered individual students' use, such as technological inexperience. Two of the scales included in the questionnaire assessed external constraints (TF and FAU) and one scale assessed internal constraints (ET).

The scales (Technical Factors (TF), Factors Affecting Use (FAU) and Experience with Technology (ET)) were considered as separate scales and accepted as forming single variable scales with equal interval units (see Chapter 5). Note that because the scale origins were specific to each separate variable, it was not mathematically legitimate to compare a mean score on one scale with the mean score on another scale. Comparisons between cultural groups could only be made *within* a particular scale, although the relative positions (that is, the patterns of mean scores) of each group could be compared across scales.

Differences between Cultural Groups

A one-way analysis of variance (ANOVA) based on Australia (AU), Malaysia (MA) and the U.S. (US) was conducted for the TF, FAU and ET scales (Table 7.1).

MANOVA analyses were not used because each of the three variables measured different constructs. Based on the ANOVA analyses, statistically significant differences were found among the three groups ($p < 0.05$) on each of the three scales.

Table 7.1 Analysis of variance statistics for the TF, FAU and ET scales (in logits) for AU, MA and US.

Scale	Level of analysis	Sum sq.	Df	Mean sq.	F	P value
Technical Factors (TF)	Between Groups	47.32	2	23.66	20.81	0.00*
	Within Groups	192.15	169	1.13		
Factors Affecting Use (FAU)	Between Groups	87.53	2	43.77	36.78	0.00*
	Within Groups	201.09	169	1.19		
Experience with Technology (ET)	Between Groups	30.66	2	15.33	12.59	0.00*
	Within Groups	205.63	169	1.21		

* Significant mean difference at the $p < 0.05$ level.

Post-hoc comparisons were conducted using the Scheffe procedure (Table 7.2). The differences between the mean scores were statistically significant on all but two of the cultural group comparisons. No significant differences were found between Australia and Malaysia on the TF scale, or between Australia and the U.S. on the ET scale.

Table 7.2 Post hoc Scheffe comparisons for TF, FAU and ET scales for AU, MA and US.

Scale	Country comparisons	Scheffe F-test
Technical Factors (TF)	AU and MA	-0.30
	AU and US	-0.90*
	US and MA	-1.21*
Factors Affecting Use (FAU)	AU and MA	-0.66*
	AU and US	1.04*
	US and MA	1.70*
Experience with Technology (ET)	AU and MA	0.57*
	AU and US	0.45
	US and MA	1.03*

* Significant mean difference at the $p < 0.05$ level.

The mean scores generated from Australian, Malaysian and U.S. responses were significantly different on the TF, FAU and ET scales (Table 7.3). The mean score was highest among the Malaysian sample on the TF and FAU scales, indicating that Malaysian students endorsed statements representing technical factors and factors affecting use more than Australian or U.S. students. The mean score for Malaysia was lowest on the ET scale, indicating that Malaysian students reported the least experience with technology as compared, on average, to Australian or U.S. students.

Table 7.3 Means and standard deviations (in logits) for the TF, FAU and ET Scales for AU, MA and US.

Scale	Country	N	Mean (in logits)	Std. Deviation
Technical	MA	52	0.06	1.15
Factors (TF)	AU	55	-0.24	1.03
	US	65	-1.14	1.02
Factors	MA	52	0.09	1.03
Affecting Use	AU	55	-0.56	1.06
(FAU)	US	65	-1.61	1.15
Experience with	MA	52	0.45	1.08
Technology (ET)	AU	55	-0.12	0.81
	US	65	-0.90	1.30

In the next section, the mean scores of the TF, FAU and ET scales are displayed graphically to show the differences among the cultural groups (Figures 7.1, 7.2 and 7.3).

Technical Factors (TF)

The TF scale assessed the technical factors that constrained students' use of the technologies, such as internet speed, computer hardware/software and the website interface design. Figure 7.1 displays the mean scores from each cultural group using the logit scores.

Figure 7.1 Mean scores (in logits) for the TF scale for AU, MA and US.
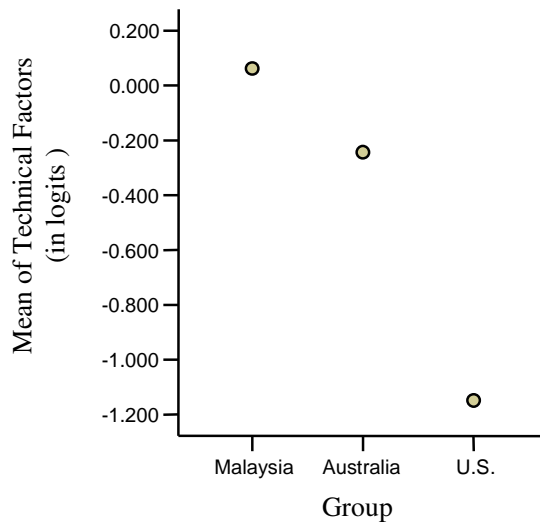
The mean score was highest among Malaysian students and lowest among the U.S. students and Australia was in the middle. As shown in Table 7.2, statistically significant differences were found between Australia and the U.S., and the U.S. and Malaysia, but not between Australia and Malaysia. This means that Malaysian students and Australian students (to a slightly lesser extent) endorsed statements representing technical problems, such as internet speed and computer hardware/software more than U.S. students.

Factors Affecting Use (FAU)

The FAU scale examined the non-technical factors that constrained students' use of the technologies, such as students' access to on-campus computing facilities. Figure 7.2 (below) shows the mean scores from each cultural group (in logits).

Figure 7.2 Mean scores (in logits) for the FAU scale for AU, MA and US.
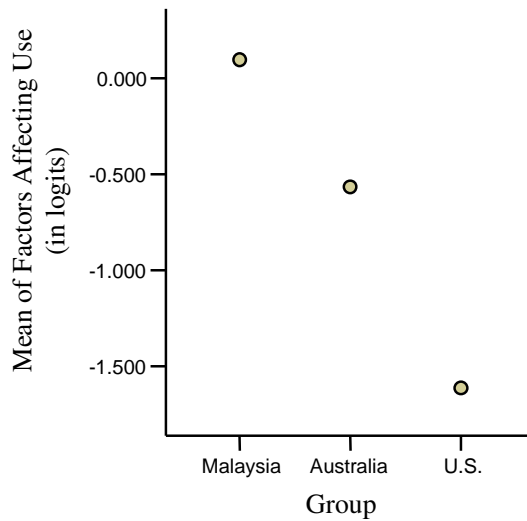
The relative positions of the mean scores for the three cultural groups shown in Figure 7.2 followed a similar pattern to the TF scale (see Figure 7.1). The mean score for Malaysia was the highest, followed by Australia and the U.S. This indicates that Malaysian students endorsed statements representing technical factors (such as limited access to computers with multimedia capabilities) more than Australian or U.S. students. There was a statistically significant difference in the extent to which the three cultural groups endorsed statements on the factors that affected their use of the technologies (Table 7.2). Overall, the trends shown in Figure 7.1 and 7.2 indicate that Malaysia was more constrained in their use of the technology than Australian or U.S. students.

Experience with Technology (ET)

The ET scale assessed students' experience with technology and included items relating to internal constraints such as students' confidence in using technology, non-educational

uses of the internet (e.g. internet shopping) and experience with online learning. Figure 7.3 (below) shows the mean scores from each cultural group (in logits).

Figure 7.3 Mean scores (in logits) for the ET scale for AU, MA and US.
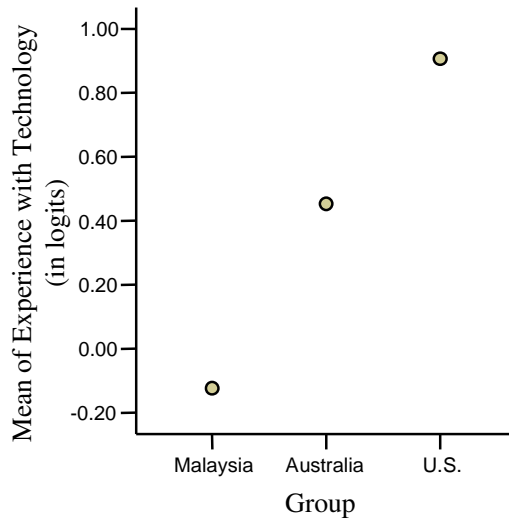
The pattern of the mean scores shown in Figure 7.3 indicates that Malaysian students endorsed statements representing experience with technology the least, when compared with Australia and the U.S. Statistically significant differences were found between Australia and Malaysia, and the U.S. and Malaysia, but not between Australia and the U.S. (Table 7.2). This suggests that despite the Malaysian government's effort to introduce technology into education, Malaysian students (from this sample) still reported lower levels of experience with technology than Australian or U.S. students.

Summary of Differences between Cultural Groups: Quantitative Analysis

Three scales in the questionnaire (Technical Factors, Factors Affecting Use and Experience with Technology) assessed the external and internal factors that influenced students' use of the online resources. The findings are summarised as follows:

➢ The one-way ANOVA analysis revealed statistically significant differences between the cultural groups on the TF, FAU and ET scales ($p < 0.05$).

➢ The post-hoc Sheffe analyses showed significant differences between countries on all three scales, except for two cultural group comparisons on the TF and ET scales (Australia and Malaysia / Australia and the U.S., respectively).

➢ The ordering of the mean scores indicated that Malaysian students endorsed statements representing technical and non-technical constraints the most. Malaysian students reported the least experience with technology when compared to Australia and the U.S. The mean scores showed that the U.S. students reported the least technical and non-technical constraints and the most experience in using technology.

➢ On all three scales, the mean scores for Australia were positioned between Malaysia and the U.S.

In the next section, I report the findings from the qualitative data on external and internal constraints and discuss the links between the quantitative and qualitative data.

Qualitative Data on External and Internal Factors Influencing Use

This section reports the qualitative findings based on the responses of 15 Australian, 18 Malaysian and 21 U.S. students (N=54). The qualitative data give insights that are not

observable in the quantitative data. These data were generated from interview and focus group transcripts, as well as student responses to open-ended items on the questionnaire survey. The data were managed using NUD*IST computer software (Non-numerical Unstructured Data * Indexing Searching and Theorizing, version 6). Statements were coded into the external and internal constraints that influenced students' use of the online resources. Where relevant, comments from the students' lecturers are included in the discussion to further illustrate the issues raised by the students.

Comparison of External and Internal Constraints between Cultural Groups

Overall, students reported a greater proportion of internal constraints (66%) than external constraints (33%). This suggests that internal constraints, such as technological inexperience and negative attitudes to educational technologies were more influential in constraining students' use of the technology than external constraints, such as students' physical access to computers.

The majority of external constraints were reported by Malaysian students (67%), and only a minority of Australian (23%) and U.S. (10%) students reported external constraints. This trend followed a similar pattern to the positions of the mean scores from the quantitative analyses in the previous section (see Figures 7.1 and 7.2). With respect to internal constraints, U.S. students reported the most number of constraints (40%). About a third of Malaysian students (35%) and Australian students (25%) reported internal constraints. These trends are elaborated in the next section.

External constraints

External constraints comprised about a third of the total number of constraints reported by students (33%). The external constraints were classified by the author into three general categories: technical factors (internet speed and problems with computer hardware/software and interface design), access to computers (infrastructure and hardware) and institutional factors (aspects of the university that were not conducive to the use of technologies). The majority of the findings presented in each of these categories arose from participants' responses to the question, *"Have you experienced any problems or difficulties in accessing the website [in your unit] or using any of its features?"* as well as responses obtained as part of answers to other related questions. Figure 7.4 shows the proportion of external constraints reported by each cultural group.

Figure 7.4 Proportion of external constraints reported by AU, MA and US students.
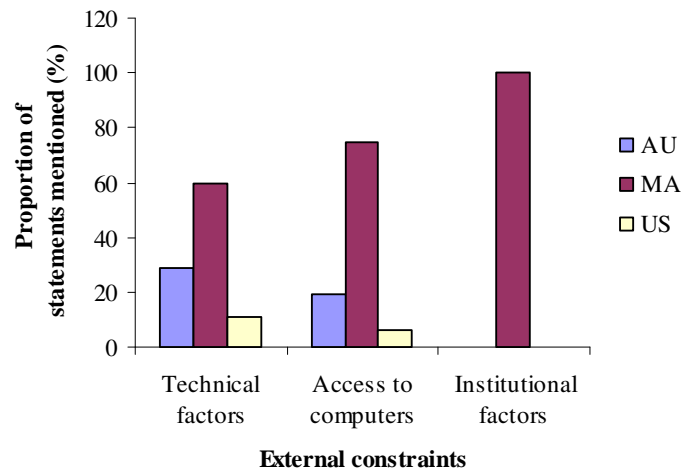
Figure 7.4 shows that Malaysian students reported the most number of technical factors (60%) when compared with Australian (29%) and U.S. (11%) students. Malaysian students reported the most difficulty in accessing a computer (75%), compared with Australian (19%) and U.S. (6%) students. In addition, Malaysian students were the only

cultural group to report institutional factors (100%). These trends are discussed in the next section.

Technical Factors

Among the statements made by participants on technical factors, Malaysian students reported the most number of constraints (60%). Only a small proportion of technical problems were reported by Australian (29%) and U.S. (11%) students (Figure 7.4). A common theme among Malaysian students was that the internet speed was inadequate, as illustrated below:

> *Internet access is bad – it is hard to get it constantly. . . the modem connection is really, really, really suckey.* (12 MA/F)

> *For iLecture, as the Internet speed is too slow, it is a waste of my time to download and wait, and it is not very clear.* (57 MA/F)

Given that the internet speed was considered inadequate by many Malaysian students, it was not surprising that some students decided not to use the online resources:

> *The layout of the website was well done overall. However, due to slow internet options, most of the time, I have decided not to use the iLecture as the "voice" was blurred.* (48 MA/F)

Other students became disinterested in learning how to use the technology:

> *Yeah, the modem. It's like now they have this broadband and they become frustrated with dial up so they give up on learning how to use the technology.* (15 MA/F)

In a similar vein, students believed that the online resources were only beneficial for those students who had adequate internet speed:

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> *It's only good for certain students. . . the access is not good enough.* (12-16 MA/M,F)

Students also reported problems concerning inadequate computer hardware and software. For example, three Malaysian students commented:

> *It is easy to gain access [to the iLecture] but there is no sound – there are no speakers there.* (1,2,3 MA/M)

In contrast to the number of technological issues reported by Malaysian students, U.S. and Australian students seemed only concerned about the inconvenience of a slow internet connection.   This is illustrated in the comments by a U.S. and Australian participant below:

> *I go to lecture all the time so I don't really need to use webcast because I have a really slow modem connection so I really can't use it unless I'm on-campus. And when I'm on-campus I really don't feel like using webcast so I would rather just go to the lecture. If I can't go to lecture, then I would probably just look at the lecture slides and that's all I do. I think lots of people use webcast because they would rather not go to class.* (12 US/M)

> *It's handy to know the iLecture is there as a backup available. However, it never worked at home and I didn't want to do it at university.* (24 AU/M)

The findings presented here support the quantitative findings described earlier on the Technical Factors scale (see Figure 7.1), which showed that Malaysian students endorsed statements representing technical difficulties more than Australian or U.S. students.

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Access to computers

Among the statements made by participants on computer access, Malaysian students reported the most number of difficulties (75%). A minority of Australian (19%) and U.S. students (6%) reported problems relating to computer access. The lack of facilities impacted students' attitudes, as illustrated in the following statement by Malaysian students:

> *I don't think people are very enthusiastic [about using the technology] because there are only 40 something computers for all the college, plus multimedia – so 100 computers for 1000 students – that's 10 percent of our students.* (4,5 MA/F)

> *I think [we need] more computers – sometimes they have classes in there and we are unable to use the computers. Sometimes the class is small but they use a big, big lab . . . for that small class. There may be five students in the class and they are using a lab with 40 computers in it – and there were just five students in there. So the other students would have no chance to use the computers.* (8,9 MA/F)

Some Australian students mentioned difficulties in gaining adequate access to computers:

> *At home we have one computer and there are the three students who are learning – we really need three computers. My parents do have money but they're not going to go out and buy three computers – that would just be ridiculous. So the people that have loads of money that can have their own laptops won't have that problem.* (8 AU/M)

These trends coincide with the quantitative findings presented in Figure 7.2, which showed that Malaysia was more constrained in their use of the technology than Australian or U.S. students.

Institutional factors

Some Malaysian students reported that their lecturers' teaching style and inexperience with technology were not conducive to using the online resources, which in effect constrained students' use of the technology. These constraints were not reported by Australian or U.S. students. For example, Malaysian students believed that their lecturers had not adapted to using technology enhancements in their teaching, which made it difficult for students to use the technology. As two participants observed:

> *The problem is that the lecturers and the students come from a different generation – when they were in school their education did not include IT or any kind of equipment that required the ones that we use now, so probably they need some time to adapt to the situation.* (10, 11 MA/F)

Students observed that the teaching practices of Malaysian lecturers limited their use of the technologies:

> *I think [our lecturer] thinks that most of us are not independent students. She doesn't think so – I think she is constantly telling us, reminding us where to check and what to do. She says, "OK, I have printed out the workshop questions for you, come and take it from me." That kind of thing – she doesn't really trust us to go into the WebCT – not all of us are actually that conscientious to go in and print it out for ourselves. She prints it out and we take it from her. Even the PowerPoint notes.* (6 MA/F)

The fact that institutional constraints were not reported by Australian or U.S. students is noteworthy because it suggests that, in addition to the technical constraints, Malaysian students also faced by institutional constraints that impinged on their use of the technologies.

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Perspectives from Malaysian lecturers

Interviews with the Malaysian lecturers may shed light on the institutional constraints described by Malaysian students. For example, a prominent theme that emerged in the interviews was that the Malaysian lecturers considered students unable to learn independently or autonomously (see Chapter 6). The lecturers described their students as primarily interested in surface-level memorisation rather than gaining a deep understanding of the unit content:

> *Students are only interested in getting a paper qualification, not understanding. They learn by rote and they have no extra capacity to learn more through online technologies.* (L2 MA/M)

The lecturers did not consider their students able to learn independently, believing that students were resistant to the use of technologies:

> *I think the students are slightly against when you say everything is on the internet – go and check for yourself.* (L1 MA/M)

In addition, the lecturers felt more comfortable with a conventional, face-to-face approach to teaching and learning:

> *I think they have become too dependent on me . . . They are not going to the website at all. Maybe it's the environment . . . The environment here is so different – students get personal attention from us. So if they have any problems they come to see us directly. So they find that there is no need for them to go into the website. . . I am here for them, very available for them. And the students are very comfortable with that.* (L3 MA/F)

This view was further supported by the lecturers' comments who believed that their students were unable to learn independently:

Students can't do anything on their own. You know, we say here that they eat the content and vomit it up on the page and leave nothing in their bodies. (L2 MA/M)

Similarly, another Malaysian lecturer commented:

They are not adapted to independent learning . . . I think my experience in Australia says that they need to be independent learners. But not here. (L1 MA/M)

The Malaysian lecturers did not believe that their students could work independently.

For example, one Malaysian lecturer commented:

Students can't do anything on their own. They need it [the content] half cooked before they can cook it completely. (L2 MA/M)

Likewise, another Malaysian lecturer said:

I think the student mindset needs to be changed – they are so used to this traditional teacher role and all these things. (L1 MA/M)

The lecturers commented that language difficulties made their teaching more

challenging, which compounded problems in using the technologies in their teaching:

It's hard for them because when they are in school they study in Bahasa – that is the medium of instruction, and then when they come to the private college they have to switch the language [to English]. So when I teach the first year students, I have a lot of problems. (L3 MA/F)

One lecturer also commented on the difficulty of using online resources to allow

students to learn more independently while complying with institutional requirements:

But [the use of technologies] doesn't make sense, because here at a private college we have to take down their attendance – if students are absent for more than three days in a month we have to send an attendance report. So you have a clash of ideals – a push for flexible delivery and then on the other hand you have an attendance roll. (L3 MA/F)

Finally, all three lecturers commented on pressure from parents not to use the technology enhancements. To take two examples:

> *There is the case of parents coming in and asking – the mother comes in and asks – "I'm paying so much money, why is it all online now?" . . . Because if you look at [the] college here, the expectation is to interact personally, not just to look at the online notes.* (L1 MA/M)

> *The parents don't want to pay all this money for a private school education and have the students learn online.* (L2 MA/M)

These statements highlight the influence that parents exerted over teaching practice, and in particular, show that parents perceived the lecturer as directly accountable for student learning through direct involvement and interaction, not via more indirect teaching methods, such as technology enhancements. These comments shed light on the issues faced by Malaysian lecturers, which help explain why students believed that the lecturers were reluctant to use the technologies in their teaching. Australian and U.S. lecturers did not report any constraints on their use of the technology, thus it is likely that these lecturers were less inhibited in their use of the online resources than the Malaysian lecturers.

Internal Constraints

Overall, internal constraints comprised about two-thirds of the total number of constraints reported by students (66%). In this category, U.S. students reported the largest proportion of internal constraints (40%), Australian students reported the lowest proportion (25%) and Malaysia was in the middle (35%). The internal constraints mentioned by students were classified by the author into three general categories:

Experience with Technology, Cultural and Educational Traditions; and, Attitudes to Technological Features (i.e. PowerPoint, iLecture/webcast, discussion board). Figure 7.5 shows the proportion of issues in the internal constraints category mentioned by Australian, Malaysian and U.S. students.

Figure 7.5 Proportion of internal constraints reported by AU, MA and US students.
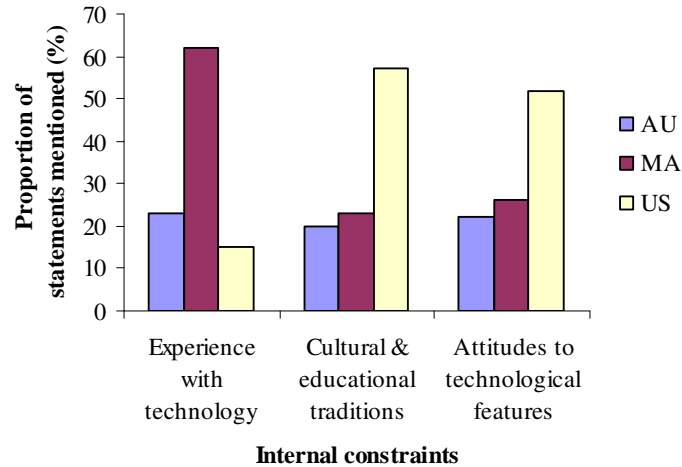
Figure 7.5 shows that among the internal constraints reported, Malaysian students reported the most concerns over their inexperience with technology (62%). U.S. students reported the most concerns over 'cultural and educational traditions' and 'attitudes to technological features' (57% and 51% respectively). These trends are discussed below.

Experience with technology

Only a small proportion of Australian (23%) and U.S. (15%) students reported that technological inexperience constrained their use of the technology, but a large proportion of Malaysian students were constrained by technological inexperience (62%) (Figure 7.5). These findings support the quantitative findings presented in the previous

section on the Experience with Technology (ET) scale (see Figure 7.3). Some

Malaysian students wanted to use the technology but were unable to do so because of

technical inexperience, as expressed by two participants below:

> *Well, I have access to the website but I don't know how to use it. I click all the buttons but I can't find anything and I can't listen to the online recording.* (4,5 MA/F)

Australian and U.S. students were concerned that their lecturers assumed that they knew

how to use the technology. As two Australian participants put it:

> *One thing I have found is sometimes it's hard to get help if you don't know how to use some of the technology. . . They make some huge assumptions about the students' ability – to assume that we are all completely computer literate when we are not. Realistically, we're not. Mature aged students may not be familiar with the technology.* (12 AU/F)

> *I would say that there are still quite a few students who don't know how to use it – from what I gather from my peers – there are people who still can't work the internet and get frustrated with it. . . . I feel that they're expecting students to be able to use technology and haven't actually been taught how to use it.* (8 AU/M)

Similarly, some U.S. students were concerned that they did not have the skills needed to

use the online resources:

> *[Unit C] is a great class because the information taught pertains to each one of us; the lack of technological skills, however, draws away from a comfortable learning experience.* (184 US/F)

Cultural and educational traditions

Across all three sample groups, students reported cultural and educational traditions that

inhibited their use of the online resources. That is, students' experiences and

expectations of teaching and learning conflicted with the processes required for learning

online. Comments in this category were most commonly reported by U.S. students (57%), followed by Malaysian (23%) and Australian (20%) students. This trend was unexpected because, as noted in the previous section, U.S. students reported the least external constraints and the most experience with technologies as compared with the other two cultural groups. That is, U.S. students were constrained in their use of the technology by expectations of traditional teaching and learning, even though they reported few constraints. Some U.S. students reported that they preferred to learn with textbooks and print-based materials than with online resources. As one U.S. student noted:

> *I've grown up on textbooks, which goes back to the whole traditional thing. I read from textbooks – you can't highlight stuff online and it's different online. Staring at a screen is very different from staring at a book.* (17 US/M)

Similarly, another U.S. student reported that she learned more effectively without the online resources:

> *Even though there are a lot of technologies, I think the old-fashioned way of just lecturing is very effective for me. I like to listen and sometimes I just want to sit down and listen to what they have to say instead of taking notes or looking at the slides, learning all the knowledge that they know.* (11 US/F)

Another U.S. student argued that online learning did not constitute a quality education and that a conventional, face-to-face approach was more beneficial for her learning:

> *I think that one thing about going to college is the lectures and if you don't go to the lectures and you think that you'll be able to get what was covered in the lecture by going online and printing out the PowerPoint slides, it's not really effective. And you're paying all this tuition money and you don't go to lecture. You are just printing out paper and you think you've got your education – it's like wasting your money.* (20 US/F)

Malaysian students also commented on certain cultural traditions that constrained their use of technology. For example, students stated that:

> *People here don't like to change – it is difficult for them to change, they need to be fed, it is the cultural thing of always being spoon-fed. The lecturers expect things to come from them, rather than finding out the information ourselves.* (12-16 MA/M,F)

> *Given the choice I think most students here still like to go to their lecturers and they probably rely more on their lectures and face-to-face contact rather than online. I mean students here are not that independent – we don't actually go and check online.* (6,7 MA/F)

Other Malaysian students did not use the website at all, as noted by two participants:

> *I think most of the students don't really go to the website. They prefer seeing the lecturer by themselves – person to person . . . I think it's the culture. . . you trust knowledge from your lecturer.* (6,7 MA/F)

Malaysian students commented that students' and lecturers' preference for face-to-face instruction inhibited their use of the online resources. For example, two participants commented:

> *The trap is that the lecturer will always help the students – whatever happens, even a small problem that occurs among the students they say, "I don't know how to do it, I don't understand". For every single thing they will go to the lecturer and ask the lecturer – how to do it, how to start doing it – things like that.* (17,18 MA/F)

These findings contrast with the rhetoric put forward in the literature, arguing that online resources can facilitate independent, flexible and tailored modes of education (see for example, Jonassen et al., 2003; McInerney and McInerney, 2002). Students' preconceived ideas about what constitutes teaching and learning may conflict with the educational approach embedded in the online resources, which may constrain their use of the technology. Thus, simply making lectures and other course material available

online does not necessarily mean that students will have the willingness or the capacity to use the technology.

Attitudes to technological features

Students were asked to comment on three specific online resources: presentation resources (PowerPoint), online lecture delivery resources (iLecture/webcast) and communication resources (discussion board). In this category of responses, U.S. students reported the most number of internal constraints (52%), whereas Malaysian (26%) and Australian (22%) students reported comparatively fewer constraints. These trends are described below.

Presentation resources: PowerPoint

U.S. students were the only cultural group to report issues that constrained their use of the PowerPoint slides. Many students believed that the PowerPoint slides did not necessarily help them learn better. To take an example, one student commented:

> *During the lecture I would just write everything down – it helps me soak up the information and understand what the teacher or professor is talking about.* (9 US/F)

> *I would definitely say it [the PowerPoint slides] speeds up the delivery of the message but I don't know how well it helps the students to digest the information.* (12 US/M)

Students commented that the PowerPoint slides contained too much information which inhibited effective learning:

Once you have a whole barrage of information on PowerPoint, students will fall asleep and no one will want to pay attention anymore because it's confusing. (13 US/F)

These findings conflict with the assumption that PowerPoint can enhance students' learning experience (see for example Peters, 2000). According to the U.S. students, PowerPoint was, on the whole, an ineffective tool for their learning. It is noteworthy that Australian and Malaysian students did not report any constraints on their use of the PowerPoint. It is possible that students in these countries may be less reflective about the potential impact of the online resources on their learning. Alternatively, it is possible that U.S. students had used the technology for a longer period of time which gave them a different view of the consequences on their learning. In the case of Malaysia, the lack of critical comments may be due to the external constraints that inhibited their use of the technology, as described in the previous section.

Online lecture delivery resources: iLecture/Webcast

In all three cultural groups, students reported that they enjoyed the experience of in-person lectures. In this context, students' preference for face-to-face lectures thus constrained their use of the online lecture recordings. Students wanted to maintain a schedule and face-to-face contact with their lecturers. As two students explained:

I'm just used to going to class and I think it's better that I'm there in person. I don't have a problem with the auditorium because I have a more stuffy auditorium the class before that, so I don't fall asleep in [Unit C]. And it's sort of fun seeing other people make comments and also when the teacher walks around, it keeps you awake. (14 US/M)

I do listen [to the iLecture], but I also feel that I would miss out if I didn't go to class. (206 AU/F)

Students believed that they could understand and comprehend the unit content better when interacting with the lecturer and other students in a face-to-face learning environment. This is illustrated in the following examples from Australian and Malaysian students:

> *I don't have a need for it because I usually just sit there in the lectures. I'm one of those people who has to be in the lecture, otherwise I'll think "Oh, my word I've missed something and I'll be paranoid about it."* (6 AU/F)

> *I am unable to understand concepts as easily online when compared to live lectures.* (79 MA/F)

Thus, the flexibility of e-learning was rejected by many students who believed that the opportunity to learning at their own pace and at their own time was actually a *disadvantage* to their learning. Note that the majority of criticisms were put forward by Australian and U.S. students, many of whom reported adequate physical access to the resources and few technical constraints. It is also noteworthy that when given a choice to learn online or face-to-face, many students rejected the flexibility of time and location that can be facilitated by online resources.

Communication resources: Discussion board

Students reported a variety of factors that constrained their use of the discussion board. For example, Malaysian students reported that they did not use the discussion board because of a perceived distance between themselves and the recipients of their messages:

I don't use the discussion board because all the other students are like strangers to me. (1,2,3 MA/M)

Maybe our questions sound a bit silly because you don't know what is happening over there. A lot of self doubt. (6,7 MA/F)

Some students reported that they preferred face-to-face interaction rather than online interaction. For example, two Australian students commented:

Well it's not that the discussion board is not useful – it's more that if I need to ask [the lecturer] something I can approach his office and ask him. Just call him and ask. I would prefer to get my answer straight from him rather than waiting. (6 AU/F)

I've never really used the discussion board partly because there's not a huge amount of participation – I don't see many people responding to it. . . . I guess if a lot of people were discussing things, then I'd put my point on it. (4 AU/M)

Thus, in principle, educational technologies might well allow access to knowledge at anytime and at anyplace. However, in practice, the findings presented here indicate that students may not utilise the flexibility and independence afforded by the technologies. Respondents in this study tended to prefer traditional lecture based settings, even though more flexible learning options may have been available.

Summary of Differences between Cultural Groups

The proportion of external and internal constraints reported by participants are summarised in Figure 7.6 below and briefly discussed in relation to the World Bank's aims for innovative delivery.

Figure 7.6 Proportion of external and internal constraints reported by AU, MA and US.
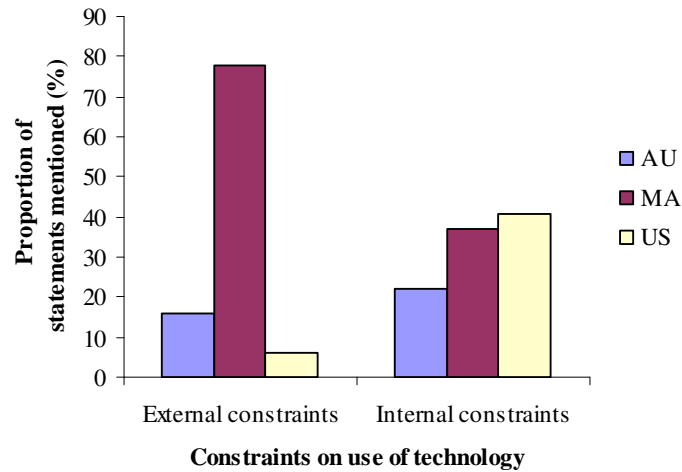
Overall, Malaysian students reported the most number of external constraints. This trend was evident in both the qualitative and quantitative data. In the category of external constraints, Malaysian students discussed a number of institutional constraints that were not mentioned by the other cultural groups.

Across all three cultural groups, the majority of factors that inhibited students' use of the technology were internal constraints. The qualitative findings showed that the U.S. students reported the most number of internal constraints, followed by Malaysia and Australia. A recurring theme in students' comments was that they preferred the interaction of face-to-face learning and generally found this to be more effective for their learning.

Although the World Bank acknowledges that external constraints (such as computer infrastructure and connectivity) may inhibit the use of technologies, the Bank does not appear to recognise the internal constraints that may influence students' use. Findings indicated that technical knowledge and experience, language barriers, institutional

factors and socio-cultural factors all played a role in students' use and acceptance of technology for their learning. Thus, simply increasing the availability of computer infrastructure and connectivity is unlikely to overcome existing barriers to education unless consideration is also given to the internal constraints faced by students and their lecturers.

In the next chapter, I examine the extent to which students' attitudes and use of the online resources was consistent with the principles of student-centred learning.

Chapter Eight

Innovative Delivery and Student-Centred Learning

The revolution in information technology will provide unprecedented opportunities to . . . fundamentally rethink what should be learned and how. (World Bank, 1999 p. 2)

Introduction

A third assumption proposed by the World Bank is that innovative delivery can improve the quality of education by facilitating a student-centred approach to learning. The purpose of this chapter is to examine the extent to which the availability of online resources actually facilitated student-centred learning among the students in the sample groups. To begin, I present the quantitative findings generated from Australian, Malaysian and U.S. students' responses to the questionnaire designed for this study. Next, I present the qualitative findings based on the interviews, focus groups and responses to the open-ended questionnaire items. Where relevant, comments from the students' lecturers are included in the discussion to clarify and explain the issues raised by students. To conclude this chapter, I consider the findings in relation to the assumptions embedded in the World Bank's policy on pedagogy and innovative delivery.

Quantitative Findings on Students' Attitudes to and Use of Online Resources

This section reports the quantitative findings generated from 55 Australian (AU), 52 Malaysian (MA) and 64 U.S. (US) students' responses to the five questionnaire scales that examined students' attitudes to and use of online resources for teaching and learning: Motivation (MOT), Teaching and Learning (TL), Attitudes (ATT), Online Use (OU) and Administrative Use (ADMIN).

The scales were accepted as forming five separate, unidimensional and equal interval scales (see Chapter 5). Recall from Chapter 7 that because the five scales may have different origins, it was not mathematically legitimate to compare mean scores on one scale with mean scores on a different scale. Thus, comparisons could only be made between cultural groups *within* a given scale, although patterns of groups' relative positions across scales may be addressed.

The findings from each of the scales are discussed in relation to theories of student-centred learning and presented in three main sections: Teaching and Learning (Motivation (MOT) and Teaching and Learning (TL)), Attitudes to Online Learning (ATT), and Use of Technology (Online Use (OU) and Administrative Use (ADMIN)).

Findings on Teaching and Learning

Recall from Chapter 3 that student-centred learning is an educational approach where teachers act as 'facilitators' of learning rather than 'transmitters' of knowledge and

where students are 'independent learners' rather than 'passive recipients' of information (Cole, 2000). Students are required to participate in active learning, exploration and construction of knowledge (Jonassen et al., 2003). Related to this approach are the motivations that students bring to their learning. For example, students can be motivated by superficial goals for attending university (e.g. to enhance their social life) or by deeper goals (e.g. to understand more about a particular topic). Motivational goals that focus on understanding and reflection are considered to facilitate effective, student-centred learning.

The questionnaire designed for the present study examined students' attitudes to the roles of teachers and students, as well as their motivations for attending university. These attitudes were assessed in the Motivation (MOT) and Teaching and Learning (TL) scales. The Motivation (MOT) scale was based on the work of Saljo and Marton (1984) who examined students' motivation for learning at university. They suggested that motivations for learning are based on students' perceptions of "what learning is", which generally relate to five conceptions of learning: 'knowing more' in some vague way; memorising or learning by heart; acquiring facts and skills that can be retained and used when necessary; finding out what something really means and is understood; constructing a personal philosophy or world view (Saljo and Marton as quoted by Biggs and Telfer, 1987 p. 147). To reflect this continuum of goals for learning, the ordering of the items on the Motivation (MOT) scale ranged from social motivations for attending university, to vocationally oriented motivations, through to more intellectual orientations for learning at university. Thus, in the MOT scale, the higher the total score, the more motivated students were to learn (intellectually) at university.

The Teaching and Learning scale (TL) examined students' perception of teaching and learning. Specifically, this scale assessed three aspects: the extent to which students' viewed their teachers as facilitators of learning or transmitters of knowledge; students' preferred learning environment; and, the desirability of collaborative learning. In this scale, a high total score indicated a greater presence of student-centred attitudes to teaching and learning. The findings from the statistical analyses conducted on the MOT and TL scales are presented below.

Differences between Cultural Groups on the Teaching and Learning Scales

A one-way analysis of variance (ANOVA) based on cultural groups was conducted for each scale (Table 8.1). Because the scales assessed different aspects of students' attitudes to and use of the online resources, MANOVA analyses were not conducted. The ANOVA analysis indicated a statistically significant difference among the cultural groups on the MOT scale. Post-hoc comparisons were conducted using the Scheffe procedure (Table 8.2). The mean differences were statistically significant on the MOT scale between Australia and the U.S., and between the U.S. and Malaysia, but not between Australia and Malaysia. No statistically significant differences were found among the three cultural groups on the TL scale.

Table 8.1 Analysis of variance statistics for the MOT and TL Scale (in logits) for AU, MA, and US.

Scale	Level of analysis	Sum sq.	Df	Mean sq.	F	P value
MOT	Between Groups	16.19	2	8.10	11.82	0.00
	Within Groups	115.71	169	0.69		
TL	Between Groups	0.69	2	0.34	1.69	0.18
	Within Groups	34.73	169	0.20		

* Significant mean difference at the p < 0.05 level.

Table 8.2 Post hoc Scheffe comparisons for MOT and TL scale (in logits) for AU, MA and US.

Scale	Country comparisons	Scheffe F-test
MOT	AU and MA	-0.23
	AU and US	-0.72*
	US and MA	0.48*
TL	AU and MA	-0.01
	AU and US	-0.13
	US and MA	0.12

* Significant mean difference at the p < 0.05 level.

The mean scores generated from Australian, Malaysian and U.S. responses were significantly different on the MOT scale but not on the TL scale (Table 8.3). The mean score was highest among the U.S. sample on the MOT scale, indicating that U.S. students endorsed statements representing intellectual motivations for learning more than Australian and Malaysian students. Similarly, the mean score for the U.S. students was highest on the TL scale, showing that U.S. students endorsed statements

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representing a student-centred approach to teaching and learning more than Australian

and Malaysian students.

Table 8.3 Means and standard deviations for MOT and TL scale (in logits) for AU, MA and US.

Scale	Country	N	Mean (in logits)	Std. Deviation
MOT	AU	55	1.13	0.77
	MA	52	1.36	0.82
	US	65	1.85	0.87
TL	AU	55	0.14	0.51
	MA	52	0.15	0.41
	US	65	0.27	0.43

In the next section, the means scores of the three cultural groups are displayed

graphically (Figures 8.1 and 8.2).

Motivation (MOT)

There was a statistically significant difference ($p < 0.05$) in the extent to which students,

on average, endorsed statements representing motivation to learn in higher education.

Mean score positions (Figure 8.1) show that U.S. students scored the highest, Australian

students the least, and Malaysians were in the middle.

Figure 8.1 Mean scores (in logits) for the Motivation (MOT) scale for AU, MA and US.
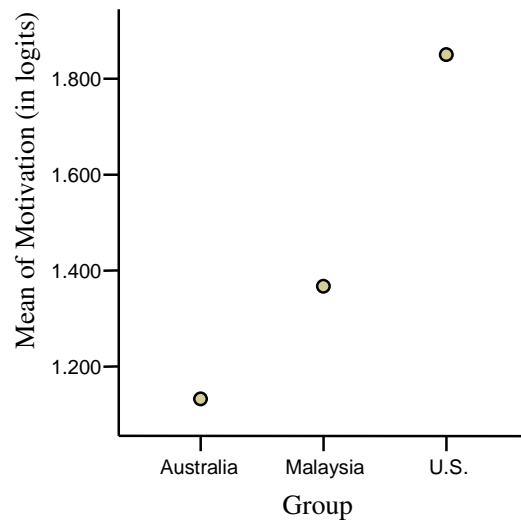
Figure 8.1 shows that the three cultural groups differed in the intensity of their motivations for studying at university. There was a tendency for the U.S. students to be more reflective and motivated by deeper learning goals than Malaysian and Australian students.

Teaching and Learning (TL)

There was no statistically significant difference (p = 0.18) in the extent to which students, on average, endorsed statements representing a student-centred approach toward teaching and learning in higher education. However, trends indicated that U.S. students endorsed statements reflecting a student-centred approach to teaching and learning the most, followed by Malaysian and Australian students (Figure 8.2).

Figure 8.2 Mean scores (in logits) for the Teaching and Learning (TL) scale for AU, MA and US.
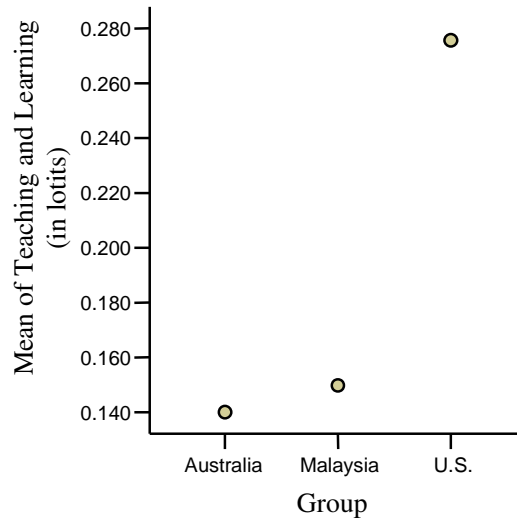
The pattern of mean scores for Malaysia and Australia were opposite to expectations. One might have expected a greater proportion of student-centred attitudes among Australian students, since Australia education has promoted student-centred learning for a longer period of time than Malaysia. Conversely, Malaysian education has traditionally been characterised as teacher-centred rather than student-centred.

Findings on Attitude to Online Learning

The Attitude (ATT) scale was the largest of the eight scales in the questionnaire and assessed students' attitudes to online learning in higher education. Higher scores were associated with positive attitudes to online learning.

Differences between Cultural Groups

A one-way analysis of variance (ANOVA) based on cultural groups was conducted for the Attitude scale (Table 8.4).   No statistically significant difference was found amongst the cultural groups on the ATT scale.

Table 8.4 Analysis of variance statistics for the ATT Scale for AU, MA and US.

Scale	Level of analysis	Sum sq.	df	Mean sq.	F	P value
ATT	Between Groups	1.40	2	0.70	1.63	0.19
	Within Groups	72.44	169	0.42		

Post-hoc comparisons were conducted using the Scheffe procedure (Table 8.5), indicating no statistical differences between the country comparisons.

Table 8.5 Post hoc Scheffe comparisons for the ATT scales for AU, MA and US.

Scale	Country comparisons	Scheffe F-test
ATT	AU and MA	-0.03
	AU and US	0.16
	US and MA	-0.20

* Significant mean difference at the p < 0.05 level.

Although not statistically significant, the trend was for the Malaysian sample to score a little higher than Australia, and for the U.S. students to score the lowest (Table 8.6).

Table 8.6 Means and standard deviations for the ATT Scale (in logits) for AU, MA and US.

Scale	Country	N	Mean (in logits)	Std. Deviation
ATT	AU	55	0.58	0.77
	MA	52	0.62	0.56
	US	64	0.41	0.61

Table 8.6 indicates that Malaysian students' attitudes to online learning tended to be, on average, more positive than the U.S. students and only slightly more positive than the Australian students.

Figure 8.3 Mean scores (in logits) for the Attitude (ATT) scale for AU, MA and US.
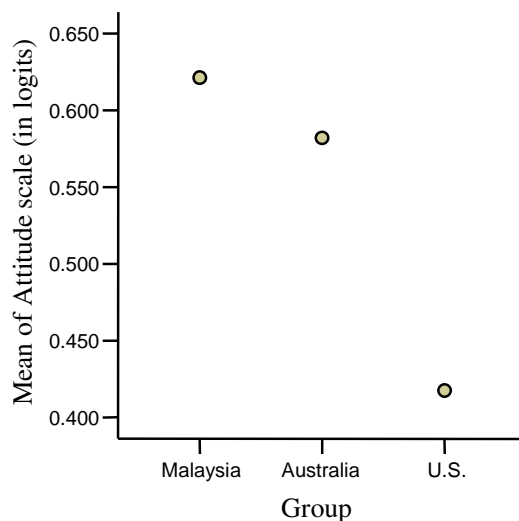
The trend shown in Figure 8.3 is noteworthy because one might have expected the U.S. students to be the most positive about online learning since they reported the least external and internal constraints on their use of the technology (see Chapter 7). Similarly, one might have expected that Malaysian students would have negative attitudes to online learning, given the number of constraints reported. The findings shown here suggest that, to the contrary, the constraints on the use of technology appear to have little bearing on students' overall attitudes to online learning. In fact, patterns

across countries are exactly opposite to expectations: U.S. students held the most negative attitudes to online learning despite reporting the lowest constraints, whereas Malaysian students, while reporting the most constraints, held the most positive attitude to online learning. Interpretations of this phenomenon are made in Chapter 9.

Findings on Students' Use of Online Resources

Two scales in the questionnaire assessed students' use of online resources: the Online Use (OU) scale and the Administrative Use (ADMIN) scale. The OU scale examined the frequency of students' use of the online resources; thus, high scores were taken to mean more use of the online resources. The ADMIN scale assessed the extent to which students used the online resources for administrative purposes (e.g. checking grades online), and in this case, a high score indicated more use of the technologies for administrative purposes.

Differences between Cultural Groups

The one-way analysis of variance (ANOVA) conducted on the Online Use (OU) and Administrative Use (ADMIN) scales revealed statistically significant differences between the cultural groups on the OU scale ($p < 0.05$) but no statistically significant differences on the ADMIN scale ($p = 0.06$), although the differences were close to the $p < 0.05$ level of significance (Table 8.7).

Table 8.7 Analysis of variance statistics for the OU and ADMIN Scales (in logits) for AU, MA and US.

Scale	Level of analysis	Sum sq.	df	Mean sq.	F	P value
OU	Between Groups	19.84	2	9.92	4.60	0.01
	Within Groups	364.04	169	2.15		
ADMIN	Between Groups	11.13	2	5.56	2.85	0.06
	Within Groups	329.32	169	1.94		

Post-hoc comparisons conducted using the Scheffe procedure (Table 8.8) revealed statistically significant mean differences between Australia and Malaysia on the OU scale. No statistically significant differences were found between Australia and the U.S. and U.S. and Malaysia on the OU scale (as expected from the ANOVA). Similarly, no statistically significant differences were found between any of the cultural groups on the ADMIN scale.

Table 8.8 Post hoc Scheffe comparisons for the OU and ADMIN Scales for AU, MA and US.

Scale	Country comparisons	Scheffe F-test
OU	AU and MA	0.85*
	AU and US	0.49
	US and MA	0.35
ADMIN	AU and MA	0.60
	AU and US	-0.49
	US and MA	0.49

* Significant mean difference at the $p < 0.05$ level.

The ordering of the mean scores for Australia, Malaysia and the U.S. were compared to determine the groups' positions relative to one another (Table 8.9). The mean score was highest among the Australian sample on both the OU and ADMIN scales.

Table 8.9 Means and standard deviations of OU and ADMIN scales (in logits) for AU, MA and US.

Scale	Country	N	Mean (in logits)	Std. Deviation
OU	AU	55	-0.22	0.94
	MA	52	-1.07	2.02
	US	64	-0.71	1.29
ADMIN	AU	55	1.52	1.30
	MA	52	0.91	1.61
	US	64	1.41	1.28

Online Use (OU)

The pattern of mean scores among the cultural groups (Figure 8.4) shows that Australian students reported the most use of the technology, Malaysian students the least, and the U.S. students were in the middle.

Figure 8.4 Mean scores (in logits) for the Online Use (OU) scale for AU, MA and US.
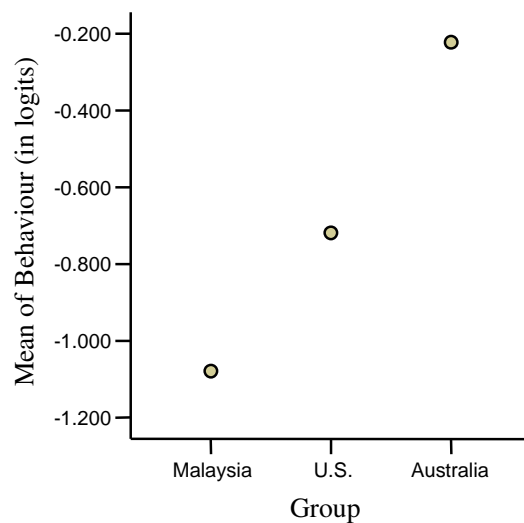
It might have been expected that U.S. students would use the technology more than the Australian students because the technology is well integrated into the U.S. education system and students reported the least constraints on their use of the technology. However, Table 8.9 and Figure 8.4 show that Australian students reported more use of the technology than the U.S. students or Malaysian students. This trend confirms expectations because of the constraints on their use (see Chapter 7).

Administrative Use (ADMIN)

The relative positions of the mean scores for the ADMIN scale were similar to the OU scale (Figure 8.5). Australian students tended to endorse statements representing administrative use of the technology the most, Malaysians the least and the U.S. was in the middle. However, these differences were not statistically significant, as stated earlier.

Figure 8.5 Mean scores (in logits) for the Administrative Use (ADMIN) scale for AU, MA and US.
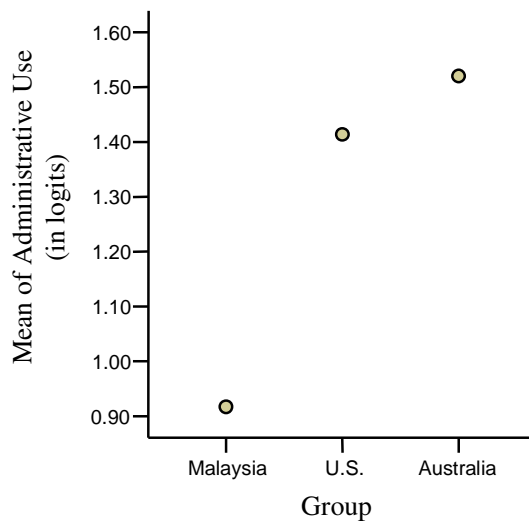
The mean score for the U.S. is closer to the mean score for Australia, indicating that U.S. and Australian students used the technology for administrative purposes more frequently than Malaysian students. It is possible that Australian and U.S. students were more likely to use the online resources for administrative purposes because they had convenient access and a faster internet connection than Malaysian students (see Chapter 7).

Summary of Differences between Cultural Groups: Quantitative Findings

Five scales in the questionnaire assessed the extent to which students' attitudes to and use of the online resources was consistent with the principles of student-centred learning. The findings are summarised below:

> ➤ The one-way ANOVA revealed statistically significant differences between the cultural groups on the Motivation scale ($p < 0.05$) but not on the other four scales.

➢ The post-hoc Sheffe analyses on the Motivation scale showed statistically significant differences between Australia and the U.S., and between the U.S. and Malaysia, but not between Australia and Malaysia.

➢ The ordering of the mean scores showed that, for the Motivation scale, the U.S. students were slightly more motivated by intellectual (rather then social or vocational) goals for their learning when compared to the other cultural groups.

➢ The ordering of the mean scores on the Teaching and Learning scale showed that the U.S had the highest score, indicating that the U.S. tended to have more student-centred attitudes to teaching and learning, although this trend was not statistically significant.

➢ On the Attitude to Online Learning scale, trends showed that Malaysian students scored the highest, suggesting a slightly more positive attitude to online learning that Australian or U.S. students.

➢ On the Online Use and Administrative Use scales, trends showed that Australian students used the online resources the most, followed by U.S. and Malaysian students.

In the next section, the qualitative findings are presented and discussed in relation to the quantitative data.

Qualitative Findings on Students' Attitudes to and Use of Online Resources

This section reports the qualitative findings based on the responses of Australian, Malaysian and U.S. students (N=54). Participants' statements were analysed in relation

to the literature on student-centred learning presented in Chapter 3. The results are discussed in four sections that relate to various aspects of student-centred learning and the use of educational technologies: online resources and the role of the teacher; online resources and the role of the student; higher level learning and critical thinking; and collaborative learning and online interaction. Where relevant, comments from the students' lecturers are also included in the discussion.

Online Resources and the Role of the Teacher

Commentators have suggested that online technologies can facilitate changes to the teacher's role from one of 'transmitter' to one of 'facilitator', increasing student independence and interdependence (see for example, Kapitzke, 2000; Tam, 2000). It has also been suggested, by the World Bank and others, that the unique characteristics of educational technologies can facilitate such changes in the role of the teacher (see for example, Sheard and Lynch, 2003; World Bank, 2002a). Participants in Australia, Malaysia and the U.S. were asked to describe the extent to which they believed the online resources facilitated such changes in their learning. Specifically, students were asked if the online resources changed their view on the role of a 'good teacher'. Overall, the majority of students reported that the availability of online technologies *changed* their perception about a 'good teacher' (65%). About a third of responses indicated that the online technologies *did not* change their view about a 'good teacher' (35%). These trends are discussed below.

Changed perceptions about the role of the teacher

The majority of students believed that the role of the teacher changed as a result of the online technologies (65%). This view was reported by about a third of students in each cultural group. Students believed that a 'good teacher' should use the technologies in their teaching, and evaluated their teachers in relation to the use of technologies. This was explained by one Australian participant:

> *I would say that [our lecturer] is a good teacher because he uses the facilities that are available to him as far as technology is concerned.* (15 AU/M)

Using online resources was seen as an essential part of teaching and learning:

> *I feel like every single subject or module in my degree has to be like that [have online resources]. And if it's not like that, it's not good enough. If you're moving forwards, you can't go backwards again.* (11 AU/M)

Similarly, students believed that a 'good teacher' should use the online resources to provide a wide variety of information and up-to-date materials. As one U.S. participant put it:

> *I also feel like a lot of the material covered in this class [is] the same recycled material over and over again. So if [the lecturer] is going to get into the information age and use technology, perhaps she needs to change the nature of the class as well to be consistent with that.* (15 US/F)

Students wanted their teachers to use the technologies to provide more detail on the lecture content. U.S. students were particularly interested in acquiring more information:

> *I think that students really want professors to post notes [online], maybe verbatim from lectures.* (19 US/M)

Malaysian students also believed that a 'good teacher' should use the online technologies to provide information on exam questions and unit assessments:

> *They should provide more examples of past questions and post that up on the internet so we can download it.* (17,18 MA/F)

Given these views, it is not surprising that students believed that a 'good teacher' should have the technical knowledge to use the technologies in their teaching.

> *[T]hey need to be able to know how to use it because I would prefer to have the lecture notes.* (3 US/F)

Across all three cultural groups, only one U.S. student reported that the technologies enabled her to be less reliant on the teacher and learn more independently:

> *[B]ecause of the technology, you don't need the teacher as much. You don't have to hear it exactly from their mouth to go find the information and you can find the information online.* (7 US/F)

The fact that only one student mentioned independent learning is surprising given that much of the literature in support of educational technologies emphasises the potential of online resources to facilitate independent learning (see for example, Chen and Macredie, 2002; Lee et al., 2002). The findings presented here suggest that students primarily viewed the online resources as a vehicle for delivering and obtaining information. Although students believed that the use of technology was an essential part of good teaching, they wanted the teacher to use the online resources to 'transmit' information and knowledge.

Unchanged perceptions about the role of the teacher

About a third of participants' comments on the role of the teacher indicated that the availability of online technologies did not change students' view on the role of a 'good teacher' (35%). The highest proportion of statements in this category was reported by U.S. students (43%) and Australian students (31%), and the lowest proportion was reported by Malaysian students (25%).

A student-centred approach to learning states that the teachers' role is one of "content expert, but also facilitator, coach, manager, as well as co-learner" (Lai, 2002, p. 344). However, comments indicated that the technologies did not change students' view on the role of the teacher because the teacher was seen as one who 'transmitted' unit content. As one U.S. student explained:

> *I'm very traditional, you go to university and are there to listen to these bright intelligent minds, don't ask questions – I know that's not what people [at our university] normally think. You're here to listen to what they have to say and possibly form your own opinions and stuff. The technologies just make it easier to stay up to date with all the material.* (19 US/M)

Other students believed that the technologies had little impact and the role of the teacher remained relatively unchanged:

> *It's like a different situation for teachers . . . the lecturer is supposed to teach things that are kind of the same.* (1 AU/M)

In summary, whether students believed the availability of technologies changed their perceptions about the role of a teacher or whether students believed that the technology had little impact, students viewed their teachers as 'transmitters' of unit content and of knowledge. For these students, the availability of online resources did not change their

view because the transmission of information was believed to occur in face-to-face situations.

Online Resources and the Role of the Student

In student-centred learning, students must take responsibility for their own learning and rely more on themselves than the teacher for the success of their learning. Authors in support of educational technologies have suggested that educational technologies can enable students to learn independently, at their own pace and at their own time (see for example, Harley, 2001). To examine the extent to which online resources enabled students to become independent learners, participants were asked to describe whether the availability of online resources changed their view on the role of a 'good student'. The majority of participants reported that the online technologies *changed* their view of a 'good student' (73%). A smaller proportion of students reported that the availability of online technologies *did not change* their view of a 'good student' (27%).

Changed perceptions about the role of the student

The majority of students believed that the role of a 'good student' changed as a result of the online technologies, enabling them to learn more independently. Among the students who commented on this issue, changes were most commonly reported by U.S. students (51%), and less commonly reported by Australian (28%) and Malaysian students (21%). These trends fit well with the quantitative findings presented earlier on the Teaching and Learning scale, which showed that the U.S. students endorsed

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statements reflecting student-centred learning, on average, more than Australian or Malaysian students (see Figure 8.2).

Students noted that the increased learner autonomy enabled them to learn at their own pace and gave them ownership over the learning process, as illustrated by the following Australian and U.S. participants:

> *It means that people can learn at their own pace to a certain extent. If they wanted to go more into depth they can, if they want to look at a particular issue in depth. It just gives people more options, which is good in the long run.* (12 AU/F)

> *[I]t's your decision if you want to go in and actually look at the things provided.* (9 US/F)

Students indicated that they were required to take more initiative in their learning:

> *I think they expect a little bit more individual initiative without prompting – as in they assume that if you have a question that you will e-mail them or if you missed the lecture that you will go to the online resources first before you go to people.* (10 US/F)

In a similar vein, Malaysian participants were also enthusiastic about the increased independence facilitated by the technologies:

> *[Our learning is] more independent because we have to go to the website and find the information for ourselves.* (4,5 MA/F)

Other Malaysian students elaborated on this theme further:

> *[Y]ou get all the information online – now you don't rely on the lecturers so much. You are studying independently – you do research and everything by yourself. What you don't understand, you just approach the lecturer.* (8,9 MA/F)

The comments from Malaysian students were surprising given that their lecturers depicted their students as rote-learners who did not (and were not able to) engage in independent learning (see Chapter 7). The contrast between the comments by Malaysian students and their lecturers suggests that the students may be moving away from traditional patterns of relating to their teachers and becoming more independent in their learning styles. However, more observation of their actual study habits and ways of learning may be necessary to confirm whether the extent to which students are moving away from their traditional learning styles.

Unchanged perceptions about the role of the student

Some students believed that the online resources had little or no impact on the role of a 'good student' (27%). Among the comments in this category, this view was most commonly reported by U.S. students (47%) and Australian students (35%), and less commonly reported by Malaysian participants (18%). For example, one U.S. participant did not perceive a change in his role as a student as a result of the technologies:

> [N]ow instead of saying go read this chapter in the textbook, he can say "go look this up online, go look at these notes online for more information". So it's the same expectations, it's just in a different medium. (21 US/M)

Similarly, Malaysian students commented:

> It's basically the same – it's just you have more ways to learn, you can go online (1,2,3 MA/M).

Like the majority of his peers, an Australian participant argued that technology made routine and procedural tasks easier but did not add to their learning *per se*:

[I]t's made it easier to submit assignments online and it makes bits and pieces easier. But apart from what's expected [of a good student], I don't think it's changed. (7 AU/M)

Students appeared to view teaching and learning with online resources as similar to face-to-face education, and did not see it as encouraging them to become more or less passive in their learning.

High Level Learning and Critical Thinking

As part of a student-centred approach to education, high level interaction is believed to occur when students are engaged in critical thinking activities such as explaining, hypothesizing, speculating alternative interpretations, and so on (Petress, 2004). Online resources are regarded by some scholars as being able to facilitate high level learning and critical thinking (Ellis, 2001). As explained in Chapters 2 and 3, the World Bank also views innovative delivery as a way to foster the high level skills and competencies relevant to the knowledge-economy.

To assess the extent to which, in practice, students used online resources for high level learning and critical thinking, participants were asked a variety of questions about their attitudes to and use of PowerPoint slides and online lecture recordings (iLecture and webcast). The findings are discussed below.

PowerPoint slides

Overall, the majority of students reported that they used the PowerPoint slides as *lecture notes* (64%). A smaller proportion of students reported that they used the slides for *revision* (14%) and as a *visual aid* (14%), and a minority reported that they used the slides *instead of a textbook* (8%).

PowerPoint slides as alternatives for lecture notes

Among those who used the PowerPoint slides as *lecture notes*, students believed that having the slides printed out before the lecture enabled them to concentrate better during the lecture. As one Australian participant put it:

> *[Y]ou're not concentrating so much on writing down all the things he has on the slides during the lecture so you can pay attention and actually have more interest in what he is saying on the topic instead of just trying to get everything down.* (14 AU/F)

Similarly, a U.S. participant suggested that the slides helped him understand the unit content better:

> *[W]ith the slides already given to us, I don't have to take as many notes so I get to pay attention more and it goes into my body and into my brain.* (17 US/M)

Malaysian students also mentioned that the slides gave them better understanding of the unit content by giving them an overview of the material to be covered:

> *PowerPoint slides are read before attending lectures to grasp what is going to be taught.* (71 MA/F)

Other students commented that the organisation of the slides facilitated better learning:

I find the outlines very helpful, especially with organising our thoughts. You can get them off Blackboard and print them out and have them for class instead of copying down the slides so you can listen to what the lecturer is saying besides what's on the slides. So it's very easy for me to coordinate, organise my thoughts around what she's talking about instead of not listening to her and just copying down what's on the slide. So I feel that the slides are very helpful. (11 US/F)

PowerPoint slides as a visual aid

Some students reported that having a visual aid helped them clarify the lecture content.

As one U.S. participant put it:

I feel that visuals are very helpful and having it there instead of trying to guess what the professor is talking about. (6 US/F)

Other students commented on the benefits of colours on the slides, as described by two

Malaysian participants below:

[W]e use the slides in the computer so we can see the colours – sometime they will use different colours for the lines and when you print it out it is just black and white so we couldn't differentiate between the colours. So I think it's best to differentiate between the lines – the thick, thin, dotted lines. It makes it easier. (8,9 MA/F)

In a similar vein, the Australian lecturer was enthusiastic about the potential of the

online technologies. As illustrated below, his views were well aligned with the rhetoric

on student-centred learning:

I really like the idea of putting the power and control in the hands of the students to use the PowerPoint because they can print them out in any format they like – they can turn it into a Word document, they can put notes with it, they can do all sorts of great things with it and actively engage with the material in new ways. And with the audio tracks they can stop me – those sorts of things I think are really empowering for students and turn the lecture from something ephemeral to something that is long-lived. (L5 AU/M)

The views of the Australian lecturer coincide with Peters (2000), who argued that PowerPoint slides provided students with a visual aid from which the stages of the presentation could be retrieved separately. Referring to PowerPoint slides, Peters (2000) wrote that, "by clicking a button students can retrieve every single stage of the presentation of these graphics in any sequence they like, which means that the concept and the appropriate commentary can be repeated and understanding and comprehension strengthened and deepened" (p. 5).

PowerPoint slides as substitutes for a textbook

Across all three cultural groups, about a third of students considered that the slides were better (or more convenient) than a textbook. For example, one Australian student commented:

> *Once I've downloaded it, it's just like reading a text. It works for me because I can do it independently and at home – it means I don't have to go to the library.* (15 AU/M)

Students regarded the slides as a convenient way to prepare for the test:

> *To take notes and be ready for the test.* (112 US/F)

And one Australian participant said that he used the slides:

> *As a guide to unit reading without lectures.* (36 AU/M)

Other students commented that the slides were useful because it was more convenient than reading a textbook. For example, one U.S. participant commented:

> *I don't like looking through 20 pages of notes to get all these miscellaneous facts. With the online stuff, you've got everything you need right there in one convenient source.* (21 US/M)

These comments suggest that students perceived the bullet points on the slide as the content of the lecture, indicating a low level use of the technology. A number of students compared the slides to a textbook, commenting on the added flexibility and convenience. One student explained that the PowerPoint slides were:

> *[M]ore helpful than the text.* (81 US/F)

Other students explained that the slides helped them to be more focused in their study:

> *[T]he book is not helpful at all, it's just like a big load of information and all you need is half of it or even less than half, and the resources that we have are just really straightforward, it's more condensed.* (6 US/F)

Students believed that what was printed on the slide was the lecture content to be learned, and did not use the slides to engage in deeper learning. This interpretation is supported by the following quotes from U.S. participants:

> *[I]t helps in the sense that it gives you what you need to know, it narrows down your view of what you need to know instead of the textbook which is totally useless I think . . . what's on the lecture slides is basically what the professor wants you to know, so I think it helps a lot.* (12 US/M)

> *[S]ometimes the information in the book there's a lot more than what she covers so it's really hard to, like I don't want to end up memorising the whole book and not really focus on what she's getting at. So I pay more attention to her lectures than the book.* (16 US/F)

Moreover, students were critical of their teachers if the slides did not provide the information relevant to the exam:

> *The midterm a couple of weeks back we all thought it was an unfair exam because there was a lot of information on her PowerPoint, but we all felt like when we took the exam there were a lot of things that weren't covered on the PowerPoint. . . And I think that when you're allowed to have this media that can*

put out so much information . . . it's like sharing information that students may not even need to know for an exam. And how are students supposed to know exactly what they have to know – they might memorise one minute detail just because the lecturer] put it on a PowerPoint slide. (13 US/F)

The U.S. lecturer also observed that her students relied on the PowerPoint slides to the exclusion of textbooks and traditional learning resources. She argued that:

Students don't want to read a book anymore, so the students coming in here a lot of them just do not want to open a book. They do not want to go to the library. There's no question about that. They want to use online resources to meet all of their learning needs if they can. (L4 US/F)

Convenience and efficiency were valued over other educational tools such as textbooks that may require more time to delve into the information. This was illustrated in the comments by an Australian student:

[I]t saves me a lot of time – if I had to read the material twice it would take so much more time and I don't think I would have bothered. (1 AU/M)

In summary, the findings presented here show that some of the students used the PowerPoint slides to engage in high level learning. However, about a third of students indicated that they did not use the slides for high level learning and critical thinking. The findings presented here suggest that the PowerPoint slides can be used as a type of 'advance organiser' that may facilitate high level learning, but can also undermine learning processes if students only learn the bullet points printed on the slide.

iLecture/Webcast

Students reported that they used the online lecture recordings to both further their understanding of the unit content (35%) and for convenience (35%). A smaller

proportion used the lecture recordings as a backup for a missed lecture (22%), and a

minority reported that they used the lecture recordings instead of a textbook (8%).

Among those who commented on using the iLecture/Webcast to further their

understanding of the lecture content, U.S. students reported the highest proportion

(66%). A smaller proportion was reported by Australian (25%) and Malaysian (9%)

students. Some students reported that they used the recordings strategically to help their

understanding of the unit:

> *What I do in the lecture, let's say she's going through something that doesn't make sense and she goes by too quickly so I look at my watch and I write down what time it is and I say it's 2:40pm, so that means it's been 30 minutes since the beginning of the lecture so I'll fast forward 30 minutes of the lecture and watch.* (17 US/M)

Similarly, an Australian participant commented:

> *If you miss something that the lecturer said you can go back and go over it many times to make you understand it.* (14 AU/F)

Some U.S. students indicated that the online lecture recordings enabled them to be more

purposeful, goal-directed and independent in their learning. For example:

> *I think [the webcast] makes me more of an independent learning than I am right now. Only because I think a lot of the classes require you to pretty much venture out on your own – you have to approach your own GSIs (Graduate Student Instructor), read the book on your own, make your own notes – I don't think the professor plays a very key role in a student's education. So the webcast really helps as a resource to understanding the material a lot more. Especially when the class consists from like anywhere from 200-800 students.* (16 US/F)

Some students reported using the online lecture recordings as a backup for missed

lectures. For example, U.S. students were more motivated by doing well in the exam:

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[I]t's definitely a nice tool and especially at the end if you're sitting there trying to study for a midterm or a final and realise I forgot this one thing then you can go online and find all past webcasts and you can find all the information you need. (21 US/M)

Similarly, two Malaysian students commented that:

I like the fact that there is always a backup . . . if I don't understand a concept I can go back and listen to the lecture online or post a question. So it's quite comforting to know that there is something out there – a safety net. (6,7 MA/F)

A small number of students reported that they used the lecture recordings instead of a textbook (8%). Of this proportion, this attitude was most commonly reported by U.S. students (54%) and Malaysian students (36%), but not commonly reported by Australian students (10%). One U.S. participant commented that:

[I]t's much easier for me than reading the text. (17 US/M)

Another U.S. student held a particularly negative attitude to textbooks:

They should ban books – it's just too hard to read all the information and distil it. Books should only be for graduates because they focus on the specific topics. But for a general overview of any subject you don't need a whole book for that. An anti-book campaign – I think [our university] should start one actually. [Our university] can start anything. (8 US/F)

Participants' emphasised the importance of convenience, autonomy and individual choice in their learning. For some students, this meant that they could engage more deeply with the material, as illustrated by one U.S. participant below:

I can watch them or study them when I'm at my top, you know sometimes when you're in lecture, you're really tired and you're not really paying attention and when you're at home you're probably not going to watch them until you're really ready to watch them so you're more likely to remember. And with my learning style I do better with big chunks at a time. (19 US/M)

For other students, the increased convenience did not translate to high level learning or

critical thinking:

> *It gives me more time to do other things and then during my spare time on the*
> *weekend I can watch the webcast. Or if I have to go to work at a certain time,*
> *so it just frees up a lot of my time.* (5 US/F)

Although students acknowledged their preference for learning with the slides and the

online lecture delivery tools, it is interesting to note that many participants still believed

that "normal" education was face-to-face:

> *I didn't replace the lectures with it, so I'm pretty much a normal student as of*
> *ten years ago – I just used it for revision purposes.* (13 AU/M)

Similarly, the U.S. lecturer believed that the webcast did not facilitate critical thinking

but helped fulfil administrative functions:

> *I'm old-fashioned in that I think that going to lecture is the best way to learn*
> *stuff and I think that . . . if they attend the webcast or the lecture I think it's*
> *helpful. I think that the materials that we post online – the old exams, the*
> *learning objectives, – having those readily available I think does provide the*
> *learning. Or at least it promotes their ability to do well on an exam.* (L4 US/F)

The Australian lecturer also believed that the teacher is central to fostering high level

learning, as explained below:

> *There's some critical thinking skills in the thinking 'I've got all these resources,*
> *how am I going to use them to my best advantage' – I guess that's a critical*
> *thinking skill to a certain point, but the critical thinking skills have got to come*
> *through the attitude of the lecturer or coordinator and the teacher. The critical*
> *thinking skills have to be created in the environment of the classroom, there's*
> *got to be challenge, there's got to be excitement – there's got to be those sorts of*
> *things.* (L5 AU/M)

Although gathering information from a variety of sources is sometimes considered an

indicator of critical thinking (Petress, 2004), it is generally agreed that critical thinking

involves more than just acquiring information and requires additional processes, such as synthesising, making judgements about information, assimilating and evaluating information from diverse sources. Thus, simply reviewing material via the online lecture instead of attending the lecture does not necessarily reflect higher levels of learning.

In summary, about a third of students reported that the online lecture recordings helped them understand the lecture content better, about a third of students enjoyed the convenience of the online tools and the remaining third used the lecture recordings as a backup for a missed lecture and instead of using a textbook. It could be argued that in the categories of reported uses, only the first category was consistent with student-centred learning because students used the online resources to facilitate deeper learning and understanding. Thus, only a third of students (and of those, most of comments were by U.S. students) reported using the online lecture recordings in a manner that was consistent with student-centred learning.

Collaborative Learning and Online Interaction

Scholars have argued that online discussion boards have the potential to facilitate collaborative learning and online interaction. Crook (1994), for example, offered a well-developed discussion on using discussion boards to facilitate collaborative learning and online interaction. Online collaboration also forms part of the World Bank's aims for innovative delivery (see Chapter 3).

Students were asked a variety of questions about their attitudes to and use of the online discussion board to gauge the extent to which they used this resource for collaborative learning and interaction. The majority of participants reported that they used the discussion board for administrative purposes (58%). Some students used the discussion board to view other students' comments or questions (40%) and a minority of students used the resource for online discussion and collaborative learning (2%).

U.S. students reported that they used the discussion board for administrative purposes (67%) more often than Australian (30%) and Malaysian (3%) students. For example, some students used the discussion board to check for announcements and class information:

> *[I]t's a source of information, it's very useful and very quick because I check my e-mail two million times a day and it's [the discussion board] good to be updated because there are some professors who don't bother with e-mail and make announcements in class or waste paper. And Blackboard – that's where she usually puts out the information where you have to go check as opposed to her telling us. So I check it three times a day, just in case.* (17 US/M)

Similarly, an Australian student commented:

> *I've used it [the discussion board] a couple of times and haven't found it very useful – it's more been of your unit contact type of query rather than a discussion board.* (9 AU/F)

The low proportion of statements from Malaysian students (8%) in this category may be due to the number of constraints on their use of the technology (see Chapter 7). In addition, Malaysian students reported that they preferred to work in groups face-to-face rather than groups online. Malaysian students made it clear that they enjoyed learning collaboratively, but not necessarily in an online environment:

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It's like sometimes we get some information that maybe I might not get and I need my friend to help me and she can tell me. I think it's very important. She is good at this subject and I am not that good and I ask her to help me and I can ask her questions. (12 MA/F)

Some students reported that they used the discussion board to view other students' questions and answers, but did not post questions online. For example, one U.S. student commented on the advantages of easy access to information:

[I]t's a really nice quick means of communication. And as a result of that communication, there can be benefits to the education process because you get this last-minute information you might need and you're aware of other sources of information and such. (21 US/M)

For some students, the online discussion board provided a forum for quiet or introverted students. This attitude was reported by both Australian and Malaysian students:

I don't tend to ask questions in person because I feel stupid so it would be easier for me to do it online. Instead of just being able to ask the teacher via email you can see if anyone else wants to answer or have other opinions. (14 AU/F)

Similarly, some students appreciated the opportunity to make a considered answer before responding to or asking questions online:

[S]tudents who are too shy to approach the lecturer in class could probably send out discussions or emails to the lecturers so that they won't feel intimidated in front of other students in case they say something wrong and say, "Oh, that's a stupid question." (10,11 MA/F)

In summary, participants' reports suggested that they did not generally use the discussion board to learn collaboratively. They did not generally post questions online or engage in discussions related to the unit content. Instead, the discussion board was mainly used for administrative purposes. Thus, the quality of the interactions and the quality of the learning experience online was not reflective of collaborative learning.

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Summary of Differences between Cultural Groups

The purpose of this chapter was to examine the extent to which students' attitudes to and use of three specific technologies (PowerPoint, online lecture recordings, email/discussion board) was consistent with a student-centred approach to learning.

Analysis of the quantitative data revealed that, on the whole, U.S. students reported the most student-centred attitudes, when compared with Malaysian and Australian students. This trend was evident in U.S. students' attitudes to teaching and learning and their motivations for attending university. However, U.S. students reported that they used the online resources the least, indicating that the presence of student-centred attitudes to teaching and learning does not necessarily translate to use of online technologies. In fact, the findings reported suggest that the more that students reflected student-centred attitudes, the less likely they were to actually use the online resources.

Quantitative analyses also showed that Malaysian students were more positive about online learning than Australian or U.S. students, but their actual reported use of the online resources was the lowest. This trend suggests more positive attitudes were associated with those students who did not have extensive exposure to the technologies. Thus, it appears that the more experience students had with the online technologies, the lower their attitudes to online learning.

The qualitative analyses revealed that the availability of online resources altered students' view of their teachers to some degree, but trends showed that students wanted teachers to use the online resources in a teacher-directed, rather than a student-directed

way. With respect to the roles of students, some students reported that the online technologies encouraged them to become more independent learners. However, in Malaysia it was evident that established teaching practices constrained the extent to which students could actually use the technologies for independent learning.

Furthermore, although some students used the PowerPoint slides for deeper learning, the majority of students in all three countries showed that students used the slides for rote-learning and memorisation. Only a few students (mainly U.S.) reported using the online lecture recordings to further their understanding of the lecture content. Moreover, students across all three cultural groups generally used the discussion board for administrative purposes and generally did not use it to engage in online collaboration.

Overall, these findings differ from much of the rhetoric put forward in support of online technologies and the role of such technologies in facilitating student-centred learning. The findings presented here indicate that technology-mediated education may be limited in its capacity to foster a student-centred approach to education, which casts doubt on the World Bank's pedagogical aims for innovative learning.

In the next chapter, I discuss and interpret the findings presented in Chapters 6, 7 and 8 in relation to the broader concepts and theories identified in Chapters 2 and 3. This discussion is used as a framework from which to consider the World Bank's claims for innovative delivery.

Chapter Nine

General Discussion

Introduction

The purpose of this chapter is to integrate and interpret the qualitative and quantitative findings presented in Chapters 6, 7 and 8. This chapter discusses the findings in relation to the research questions, beginning with the first research question: *What are students' attitudes to the nature of technology and its role in higher education?* Next, I consider the responses to the second research question: *To what extent can innovative delivery overcome existing barriers to education?* Finally, I examine the findings in relation to the third research question: *To what extent are students' attitudes to and use of technological enhancements consistent with the principles of student-centred learning?* Key issues are discussed in terms of the commonalities and differences between participants' responses and the World Bank's aims for innovative delivery.

Attitudes to the Nature of Technology and its Role in Higher Education

The first goal of this research was to qualitatively characterise students' attitudes to the nature of technology and its role in higher education and consider the extent to which

students perceived educational technologies in a similar technocratic way as the World Bank. In the following section, I discuss the findings in relation to the four major themes that emerged in the analysis: technology and progress; the role of human agency; the inevitable infusion of technologies; and concerns over technology in education.

Technology and progress

Participants from all three cultural contexts believed that individuals have the capacity and willingness to decide how and when the technology could be used to benefit their learning. Online resources were viewed as tools that could be used and controlled for both good and bad purposes. This intuitive understanding of technologies reflects an instrumental belief in the rational control of humans to control the extent to which the technology influences society and education (Feenberg, 1991).

The instrumental view of technology was more commonly reported by U.S. students and to a lesser degree, by Australian students and Malaysian students. Although the sample size of this study limits the extent to which generalisations can be made, it is nevertheless important to note that this trend has also been observed by other scholars. For example, in Segal's (1996) assessment of American culture: he argued that North Americans typically associate technology with progress. O'Sullivan (2000) also suggested that that U.S. culture has persistently embraced a utopian perspective toward technology.

Some participants believed that technological innovation was an essential precursor to educational progress. Once again, while it is difficult to extrapolate trends from a limited sample, it is possible to point to key factors that may have influenced this trend. For example, the Industrial era and the emergence of industrial capitalism had a prominent role in shaping the Western worldview (especially in the U.S.), contributing to the assumption that progress is driven by a steady and cumulative expansion of technological and scientific development (Marx, 1987). Other factors may have contributed to the Western technocratic view of progress, such as the ideologies embedded in mass production, productivity and global power embedded in Fordism. As Marx (1987) explained, "The new scientific knowledge and technological power was expected to make possible a comprehensive improvement in all the conditions of life" (para. 7). Likewise, Don Ihde (1993) commented on the pervasive belief in technology and progress that is evident in Western culture:

> Progress . . . lies deeply embedded in the culture of science. Knowledge is thought to be progressive, accumulative and qualitatively on a trajectory of either evolutionary or revolutionary improvement. And insofar as technologies are today associated with science and its culture, the same belief in progressivism is often held. (p. 62)

As explained in Chapter 2, the World Bank's policies have reflected a strong emphasis on technology as precursors for social, economic and educational progress. For over thirty years, the Bank's policies have emphasised the potential of technology to address specific educational problems (Handelman, 2003). In this respect, the instrumental attitudes reported by students concerning technology, progress and educational improvements fitted well with the World Bank's views.

The role of human agency

Another theme that emerged in the findings was the emphasis given to the role of individual and collective human agency. Some participants viewed the technology as under human direction and referred to aspects of control or discernment that individuals must exercise in order to achieve a desired (positive) outcome. This attitude is typical of the instrumental theory, which Winner (1977) described as, "men know best what they themselves have made; that the things men make are under their firm control" (p. 25). Bowers (1988) also argued that the liberal view of individualism and the spread of technicist thinking are dependent upon "the individual as an autonomous, self-directing being" (p. 12).

Overall, instrumental attitudes were more commonly mentioned by U.S. students than Malaysian or Australian students. The role of human agency was particularly evident in U.S. students' comments on the convenience of online technologies. U.S. students may be inclined to view technology as a tool that they can control and use according to their own discretion, because as O'Sullivan (2000) noted, Westerners tend to view technological developments as moving in a single, positive direction that make their lives more convenient and effective. Nisbett (2003) also observed that Westerners tend to prefer individual control (as opposed to collective control).

Some students reported that they could use the online resources to learn more independently, reflecting a belief in their capacity to use the technologies in ways that would benefit their learning. This attitude was more commonly reported by Malaysian than by Australian or U.S. students. This trend was surprising because, as a pedagogical approach, independent learning stems from a Western emphasis on the role of human

agency and the individual as an autonomous, self-directed being. Education in South East Asia has typically emphasised collaborative rather than independent learning (see for example, Watkins, 1994). In addition, the Malaysian lecturers did not consider their students able to learn independently (see Chapter 7). This suggests that some Malaysian students may be moving away from traditional approaches to education toward more Western styles of independent learning. However, more direct observation of Malaysian learning styles would be needed to confirm this trend.

The inevitable infusion of technologies

Many participants believed that the use and infusion of technology in education was inevitable. They believed that they must simply adapt to and accept the technology without necessarily questioning its benefit or application. Some suggested that the online resources were "definitely necessary", even if it was a "shock or a disturbance" (see Chapter 6). Respondents believed that they were required to learn to cope with the technology and adapt to it in order to 'keep up'. The discourse of inevitability was particularly evident in students' attitudes to the role of the teacher. Many students believed that it was imperative for teachers to use the technology and that the presence of technology improved their teachers' performance. This attitude was more prevalent among Malaysian students than among Australian or U.S. students, suggesting that Malaysian students might well feel more pressure to become technology-oriented than those in the other cultural groups. Malaysian students appeared less inclined to believe that they could control technology for their own purposes and instead believed that they had to adjust to the technology.

Theorists have described the discourse of inevitability as part of a technology-led theory of social change, where technology is seen as a precursor to change in society. This attitude may have been influenced by technology advocates such as those represented among the mass media and software designers. For example, marketing campaigns such as that of Microsoft may have influenced large sectors of the population to believe that 'keeping up' with technology is imperative to survival in today's information age. Another factor that may explain respondents' belief in the technological imperative is the influence of technology-driven reform policies that have dominated education in recent decades (Feenberg, 1999). Bowers (1988) maintained that the "technological mindset" has influenced many education reform movements. He stated that this mindset is one that "tends to view all aspects of experience in terms of problems that require technical solutions" (p. 8).

Concerns over technology in education

Not all participants were optimistic or enthusiastic about the online resources. Participants raised many concerns over the extent to which the online technologies actually improved education. For example, concerns were raised over the potential for increased laziness (for both students and lecturers), the increased the distance between students and lecturers, a negative impact on existing university culture, and an increase in destructive forms of competition among students. Respondents also pointed to the kind of limiting social experiences associated with technology-mediated education, such as learning at home in solitude at a computer, or possibly with other learners at a computer lab who are also working alone at a computer.

Malaysian students were less inclined than Australian or U.S. students to express concerns over the use of online resources. The lack of critical comments expressed by Malaysian participants may indicate a less informed position about the online resources through comparatively limited exposure to the technology itself (see Chapter 7). Moreover, the lack of questioning by Malaysian students may also indicate a cultural tendency to avoid openly questioning aspects of the education system. Commentators have described South East Asian students as more conforming to rules than their Western counterparts and less likely to question what is handed down by authority figures (Biggs as quoted by Watkins, 1994).

On the whole, U.S. students were more willing to express critical opinions than the Australian or Malaysian students. This may be because U.S. participants had used it for longer and therefore may have experienced undesirable some effects of the technology. This trend coincides with Marx's (1987) observations, who commented on a general decline in American attitudes towards technology. Marx's (1987) comparison of American and Chinese attitudes found that the general disillusionment toward technology in American attitudes was not evident in Chinese attitudes, where views on technology appeared to remain positive. Marx (1987) noted that over the last half-century Americans have become more cynical about science and technology as one of the "Four Modernisations" (para. 2). Based on this, one could argue that experience with technology does not necessarily mean that positive attitudes will follow. In fact, the findings in this study indicate the reverse: attitudes to technology generally decline with longer exposure.

Thus, efforts to expand technological infrastructure and increase experience with technology may not necessarily mean that people actually use the technology; as people gain experience with the technology they may become cynical and disillusioned about its undesirable consequences. The negativity towards technology expressed by U.S. and to a lesser extent by Australian participants may be a reflection of an increasing awareness of the negative consequences of technology. As Marx (1987) noted, "A growing number of Americans have adopted a sceptical, even negative, view of technological innovation as an index of social progress" (para. 1). Disasters such as the threat of nuclear holocaust, pollution, degradation of environmental ecosystems, and so on have undermined people's faith in technology and progress, and have prompted consideration of the ways in which technologies are used for negative and detrimental purposes. Segal (1996) also commented on the greater awareness of the negative outcomes of technology. He argued that despite scientific and technological breakthroughs, "there emerged in recent decades a declining trust in the social and political applications of knowledge more broadly, in technical expertise itself" (p. 39).

As previously explained, the World Bank suggests that technological innovation is a central component in educational progress, arguing that if technological advances are secured, a corresponding degree of improvement will follow in social, political and educational facets of life. The perceived universality of technology implies that it can improve education, pedagogies and social contexts, regardless of the differences between cultural contexts.

Trends in this study cast doubt on the Bank's instrumental view of technology. Attitudes obviously vary within and between cultures; however, the findings presented

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suggest that there are basic differences in attitudes to technology that stem from culturally defined ways of viewing the world. Thus, although ICTs might well be a necessary and positive component in higher education, one must also consider the less idyllic aspects of online learning. In particular, consideration must be given to the ways in which the use of technologies changes the paradigm of teaching and learning, particularly in areas such as increasing student laziness and increasing the distance between teachers and students. Furthermore, the cultural particularities specific to the country accessing and using the technologies must be considered to avoid the homogenisation of educational practice.

The Potential of Innovative Delivery to Overcome Barriers to Education

The second research goal was to examine the extent to which innovative delivery can overcome existing barriers to education by identifying the factors that influenced students' use of the online resources. In the following section, I discuss the findings in relation to the three major themes that emerged in the analysis: technological infrastructure and connectivity; technical knowledge and experience; and socio-cultural influences.

Technological infrastructure and connectivity

Participants across all three countries reported a number of external factors that constrained their use of the online resources, such as computer access, internet speed and computer hardware/software. Although some Malaysian students' reported that

they had adequate access, a clear majority of Malaysian students reported that they did not have sufficient infrastructure to use the online resources. This trend was evident in both the qualitative and quantitative analyses. By contrast, U.S. and Australian students reported few external constraints and appeared to have adequate technological infrastructure.

The World Bank aims to use technologies to increase the educational opportunities for those in developing countries, not just for those in wealthy and technologically privileged countries (World Bank, 2002a). However, the findings presented here suggest that educational technologies are more likely to increase opportunities for those in technologically privileged countries (Australia and the U.S.) than for those in Malaysia. If middle-income countries such as Malaysia do not have adequate technological infrastructure, it follows that much work would be required if the Bank is to achieve its goal in increasing educational opportunities in countries that are less developed.

Technological knowledge and experience

In comparison to Australian and U.S. students, the Malaysian students reported the least experience with technology. This trend was evident in both the quantitative and qualitative data analyses. Malaysian students reported that they did not know how to use the online resources and that the virtual learning environment was sometimes confusing and challenging. This suggests that they may not possess the range of skills required for learning online, such as navigating around non-sequential writing and links connecting branches of text. Hypertext requires some degree of learner independence

because students are required to navigate around a main 'path' with a multitude of hyperlinks or 'branches' that provide alternative representations of the same concept or related information (Hartley, 2001). Thus, it appears that even if the appropriate technological infrastructure was available, it is likely that some Malaysian students might still need direct instruction on the specific skills required for online learning.

Although the majority of Australian and U.S. students believed that their technological knowledge and experience was adequate, some students still expressed concern that they did not possess the range of skills required. These students believed that their lecturers assumed a high level of technological expertise that was not shared by all students. They felt that their lecturers gave few concessions for inadequate technical knowledge. From this, one can infer that even among developed countries, implementation of online learning must also be accompanied by consideration of individual student capabilities and skills, which may include direct teaching about the basic procedures on how to use technology, including hypertext and the virtual learning environment.

Socio-cultural influences

Participants from all three cultural contexts reported socio-cultural factors that influenced their use of the technologies. For example, even though the U.S. students reported the least technical constraints and the most technological experience, some students still used the online resources sparingly because they preferred face-to-face lectures. Moreover, U.S. students believed that their learning was more effective with textbooks and print-based materials than with online resources. With respect to

PowerPoint slides, U.S. students reported that it did not enhance their learning experience, and on the whole, was not as effective as conventional learning resources. In all three cultural groups, the majority of students believed that face-to-face lectures were more beneficial for their learning than the iLecture or webcast. This coincides with the observation put forward by Cunningham et al. (1998): "Any decision to move into mass or niche market education delivery via communication and information technologies must take account of the personal preferences of individual consumers in modes of learning" (p. 164).

The World Bank does not appear to consider the personal preferences of individual users, nor does it consider the socio-cultural constraints on the use of technology. The Bank assumes that once students have an appropriate level of technological infrastructure, they will use the technology to further their educational experiences. For example, the Bank stated that, "Once the Internet is available to learners in all countries, learners will no longer be at the mercy of poorly qualified teachers. Students anywhere in the world . . . will be able to download course content" (World Bank, 2003 p. 41). The findings presented here suggest that many factors influence the extent to which students may benefit from the online resources, even if the appropriate technological infrastructure is provided.

Malaysian students reported a number of institutional factors that constrained their use of the online resources, such as their lecturers' teaching style. For example, the Malaysian lecturers tended to rely on face-to-face interaction and direct instruction which gave little opportunity for the students to exercise independent learning online. Thus, while the lecturers readily acknowledged the benefits of the online technologies,

in practice they lacked the incentive and willingness to reduce control over the teaching process and allow students to learn more independently. These findings reflect Mowshowitz's (1984) observations, noting that a variety of social and cultural constraints, "mediate the realisation of some of the potentials of technology and bar others" (p. 86).

The lecturers' ability to reduce control over the teaching process was constrained by the College requirement to keep a student attendance roll. This regulation would not seem to encourage flexible or independent learning, with or without the use of technologies. Thus, even if the lecturers did acquire the knowledge and skills to encourage more independent learning online, changes to educational practice would be difficult unless institutional policies were also altered. These trends coincide with comments by Joo (1999) on the impact of culture on internet use:

> [I]n societies where discipline and submission to authority is praised rather than individualism and freedom, teachers might feel too uncomfortable to take initiatives, to accept the scrutiny of their peers, or to hand greater control to their students. Likewise, students accustomed to traditional methods may find it hard to adapt to active and innovative learning techniques. (p. 247)

Thus, implementation of online learning is likely to be complex, particularly for those operating in educational traditions that are typically teacher-centred. Sheard (2003) commented on the difficulty of addressing the diversity of educational practice in online learning:

> Online environments offer the possibility of providing access to education that is more flexible and more responsive to students' needs. However, it is possible that such environments, while responding to the anywhere-anytime needs of students, fail to address the diversity of students in terms of learning style, modality, preference, computer skills and experience. (p. 10)

The findings presented in this study confirm Sofield's (2000) observation that simply solving technological infrastructure may not necessarily increase access to education through online learning. It appears that the World Bank has taken an overly simplistic view of technology adoption and that although infrastructure is clearly of central importance, it is only one of several issues that are critical in the uptake of online learning.

Innovative Delivery and Student-Centred Learning

The third goal of this research was to assess the extent to which students' attitudes to and use of online resources was consistent with a student-centred approach. One purpose was to identify whether the availability of new technologies altered students' views on the roles of teachers and students. Another purpose was to establish whether students used the online resources for high level learning and critical thinking. The analyses also aimed to determine the extent to which the availability of online resources facilitated collaborative learning online.

Conceptions of teaching and learning

Students from all three cultural groups reported that they wanted their teachers to use the online resources to provide more information online. For example, students tended to view their teachers as authority figures whose role was to provide information and knowledge to help students pass the tests. Students believed that to be effective and remain 'up-to-date', lecturers should use technologies in their teaching, but primarily as a vehicle to disseminate more information. This transmissive, teacher-centred view may

stem from the early behaviourist view, where computers were seen only as a tool for delivering information (see Chapter 3). Even the World Bank acknowledged that early computer-assisted instruction from the 1980s and early 1990s was often highly repetitive (World Bank, 2003). It seems that the vestiges of this approach may have influenced teaching practice and students' attitudes.

Overall, students reported that they did not use the online resources for high level learning and critical thinking. One possible explanation for this trend might be that the lecturers tended to present the online resources as vehicles to search for and retrieve information instead of as a tool to engage students in high-level learning. Across all three cultural groups, the lecturers generally did not encourage students to explore the web and critically evaluate information online. As Lai (2002) pointed out, "Teachers should encourage students to set their learning goals . . . gather information from multiple sources . . . evaluate the information retrieved and then make informed decisions". Thus, without support embedded into the unit structure by teachers, it is unlikely that students would have the incentive to use the online resources to engage in high level learning.

Similarly, the design of the units provided few opportunities for students to learn collaboratively online. It is likely that students simply did not see the relevance of online interaction in meeting the unit objectives. The lecturers did not participate in the online discussions as online mediators, and appeared to simply add online resources on to the existing curriculum rather than pedagogically redesigning the units to take into account the characteristics of the new technology. When online resources are simply added on to an existing curriculum structure, and particularly where the existing

structure is a traditional lecture-style format, the online resources may be restricted to administrative functions. Littlejohn and Stefani (2002) argued that the online resources need to be "thoughtfully included in ways which fully consider pedagogical parameters" (Littlejohn and Stefani as quoted by Brown, 2002 p. 586).

This indicates that if the online communication tools are to be used in accord with the World Bank's aims, people's conception of the potential of the communication tools would need to be broadened. In addition, the structure of the unit would need to include a greater degree of involvement by the lecturer. Moreover, the use of technologies may be more effective if teachers are shown ways in which online resources can be integrated into existing unit structures.

In the Malaysian colleges, using online resources to facilitate student-centred and independent learning presents a substantial departure from existing educational practice that has been primarily face-to-face and teacher-centred. Anecdotes from lecturers suggested that the institutional policy, parents' attitudes and students' mindsets would have to be altered for online learning to be accepted as a valid way of learning. Similarly, if online learning is to be accepted as a suitable vehicle for facilitated high level learning and critical thinking, students' conception of the tools necessary for achieving deeper learning would have to change.

Based on the findings presented in this study, it seems that the potential of online learning can only be realised when both teachers and students alter their expectations of the teaching and learning process. Kerr (1996) observed that educational technologies are quantitatively and qualitatively different from other kinds of classroom innovations

because it requires radical shifts in "understandings about the role of technology in higher education, teaching/learning style, the teacher's/students vision of what classroom life is all about, and what educational tools can accomplish these educational goals" (p. 24). More recently, Gillani (2003) commented on the changes that would be required for online learning to be successful:

> With such explosion in information coupled with recent technological advancement . . . and greater demand for e-learning, one would expect revolutionary changes in educational practices. Unfortunately, to challenge the demands of the information age and the potential of advancement, educators still define education as a process of going to classrooms, listening to lectures, memorising facts and reciting them on the final exam only to forget them in a few years if not months. Such a process is not the most effective way to learn in a modern society where the information age has become a reality (p. 121)

According to Blacker and McKie (2003), effective use of technologies in education should at present be understood as an "*aspiration*, a prescription whose realisation depends upon the skill of teachers and the will of learners to bring the 'educational' and the 'technology' together" (p. 234 – 235, italics in original). Similarly, Ehrmann (1999) argued that:

> Technologies such as computers (or pencils) don't have pre-determined influence; it's their *uses* that influence outcomes. This statement seems obvious, but many institutions act as though the mere presence of technology will improve learning. They use computers to teach the same things in the same ways as before, yet they expect learning outcomes to be better. (Ehrmann as quoted by Currie et al., 2003a p. 162, italics in original)

Given the magnitude of the changes required, the question arises as to the possible consequences of altering established traditions of teaching and learning through the use of technologies. To what extent should individualized, flexible and autonomous learning be promoted as the preferred educational approach? And importantly, to what

extent should educators and students be expected to alter their view of the learning process to become more technocratic?

These questions are of particular concern when one considers altering the educational traditions of countries like Malaysia, where teaching and learning has typically been face-to-face and hierarchical. Based on the assumption that all educational programmes reflect a 'world view' in terms of their values and pedagogies and that all educational programmes reflect particular epistemologies, learning theories and goals of the cultures in which they are generated (McLoughlin and Oliver, 2000), to what extent should educators and students be encouraged to change to local, pre-existing traditions to adapt to a more Western style of teaching and learning?

Answers to such questions relate to one's underlying assumptions about the aims and purposes of education. In particular, these questions relate to the kinds of educational tools that can be used to achieve basic educational aims. These issues are considered in the next section.

The amplifying-reducing nature of online resources

Don Ihde (1993) argued that all tools, including educational tools, embody basic biases toward one kind of experience rather than another, which can either 'amplify' or 'reduce' certain aspects of educational experience relative to others. That is, educators make a pedagogical choice that "amplifies" an aspect of the world for the student at that moment. Blacker and McKie's (2003) discussion of Ihde's analysis suggested that the

amplifying-reducing nature of technology is, "inescapable and it is basic to considering the educative use of technology" (p. 236).

For example, in the present study the amplifying-reducing nature of educational technologies is evident in students' reported use of the PowerPoint slides. Responses revealed a tendency for students (especially U.S. students) to only learn what was printed on the PowerPoint slide without going beyond the bullet points to learn the broader content of the unit. Note the comments from one U.S. participant:

> *Having the lecture slides, you have your title, you know your points, everything is straightforward.* (6 US/F)

By design, one must condense ideas into the preconceived format of a PowerPoint slide and reduce complicated issues into headings and bullet points. Complex ideas are often distilled into brief snippets of information and displayed in bullet points. If students only learn the summarised bullet points, without necessarily embellishing the content or argument to be taught, then using Don Ihde's terminology, what is amplified is the efficiency of learning summarised bullet points, and what is reduced is deep learning and critical understanding of the lecture content. Learning the bullet points may also "remove" the student further from the material because the summary they received is not necessarily constructed by the individual. As Currie et al. (2003a) noted, "Ready-made productions are only one step away from ready-made thinking" (p. 162).

Moreover, the online environment implies usage along predetermined paths and links, which as Blacker and McKie (2003) argued, shape our expectations of the education process and may usurp different kinds of educational experiences that are available. For example, when using the online lecture delivery tools (iLecture and webcast), a

student may learn the content of the recorded lecture, while also "learning" that acquiring information must be instantly available and packaged at the individual's request. Currie et al. (2003a) argued further that using technological tools and networks in education inevitably leads to the "formatting of thought itself", a process that has the potential to reduce all sources of knowledge to a certain uniformity (p. 166).

Findings indicated that students are confronted with complex challenges and increasing pressures from their institutions and society at large. In this, the online resources enabled students to become more strategic in their learning. However, it is possible that while students' skills in knowledge acquisition were amplified, skills of reflection and sustained concentration (such as those required to read a textbook) were correspondingly reduced. Blacker and McKie's (2003) comments summarise this point: "Educational practice colludes with this in its anxiety for greater effectiveness, understood as quicker thorough-put" (p. 234).

In a similar vein, the Australian lecturer commented that the online lecture delivery tools reduced students' attendance to in-person lectures. In this case, what was amplified was student autonomy in terms of where and when students listen to the lecture, and what was reduced was the face-to-face teacher-student interaction. Furthermore, the U.S. lecturer was critical of students' preference to use online resources rather than books for their learning needs. According to the U.S. lecturer, the students were becoming lazy and they were not using the technology for active learning but for "lazy learning". In this case, what was amplified was "lazy learning", and active learning" was reduced.

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Technology enthusiasts argue that the greater independence and learner autonomy facilitated by the technologies may lead to high level learning, critical thinking, analysis, evaluation, and so on. However, the findings presented here suggest that online learning is challenging established views of what education is, and specifically, what educational tools can be used to facilitate high level learning and critical thinking. Based on this, it is misleading to regard online resources from an instrumental perspective as 'value free' or 'general purpose' tools that simply convey information. As Ellul (1990) insisted, "technique [i.e. technology] carries with it its own effects quite apart from how it is used. . . No matter how it is used, it has of itself a number of positive and negative consequences. This is not just a matter of intention" (p. 35).

These findings highlight a paradox in the World Bank policy statements. On the one hand, the Bank wants students to use the internet to "go beyond the classroom", and on the other, achieve "better reading . . . skills" (World Bank, 1999). The question arises then, can PowerPoint slides enable students to have more access to information and foster critical thinking skills? Are students learning to think critically, or are they merely learning simplified bullet points that replace the textbook? Can PowerPoint slides facilitate critical thinking, as proposed in the literature? As Lauzon (1999) argued, learners may be actively engaged with the technology but they may not be actively engaged with the material in critically meaningful ways (Lauzon, 1999). In the absence of answers to these fundamental issues, innovative delivery might well fail to foster student-centred approaches to learning and might well be incompatible with genuine educational progress.

Summary

This chapter examined the results from case studies in Australia, Malaysia and the U.S. in relation to the World Bank's policy on innovative delivery. In considering respondents' attitudes to online technologies, the factors that influence their use, and how they use these technologies in their learning, it is questionable whether technology is a necessary and positive component in education. The findings cast doubt on whether online learning will improve learning opportunities, even if problems of technological infrastructure are addressed. Moreover, the extent to which technologies improve pedagogy and foster student-centred learning across different cultural contexts may be limited.

Chapter Ten

Conclusions

Introduction

Over the past thirty years, the World Bank has intensified its activities relating to education in developing countries. Recent changes to the World Bank's policy for education have been the inclusion of innovative delivery as one of four global priorities for education that aim to alleviate poverty in developing countries. Advances in new ICTs are viewed by the World Bank as an important way to increase access to education and expand the range and quality of educational programs in developing countries (World Bank, 1999).

In this thesis I have sought to interrogate the World Bank's assumptions on innovative delivery as expressed in the 1999 *Education Sector Strategy Report* and augmented in the 2005 *Education Sector Strategy Update*. This thesis focused on three dimensions of innovative delivery as expressed in the ES99: the nature of technology and its role in education; the potential of innovative delivery to overcome existing barriers to education; and the potential of innovative delivery to facilitate student-centred learning.

A mixed methods approach was used to capture detailed qualitative and quantitative data on students' attitudes to and use of online resources in different cultural contexts. Three bodies of literature were used to interpret the findings in relation to the World Bank's assumptions of interest. This chapter provides a summary of the major findings and outlines the contributions and limitations of this research. I consider the directions for future research and conclude with possible applications of the findings.

Summary of Findings

The findings from this thesis are summarised and presented in four sections: the Rasch measurement model; the nature of technology and its role in higher education; overcoming existing barriers to education; and pedagogical implications.

The Rasch measurement model

One goal of this thesis was to design and validate a questionnaire to assess students' attitudes to and use of online technologies. The questionnaire designed for the present study included eight scales and the validity and reliability of these scales was examined using the Rasch measurement model.

The questionnaire included Likert-type rating scales with two, five and six categories for different questions. Several tests of fit were conducted using the RUMM 2020 software to determine the extent to which the data fit the Rasch model. Results from the tests of fit (fit statistics, Item Characteristic Curves and Category Characteristic Curves) as well as the Person Separation Indexes showed that fewer than five-percent of the

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items in any scale did not fit the model. This small proportion of misfit was expected and thus it was concluded that the items formed scales with equal intervals that operationalised single variables. Because construct validity was achieved, the findings generated from students' responses to the questionnaire were considered a reliable and valid measure of students' attitudes to and use of online resources in higher education.

The analyses conducted using the Rasch model clearly indicated that it would have been better to use three or four response categories instead of six response categories. In addition, the analyses revealed some items that did not fit the model and these items were eliminated. For future use of the questionnaire, analyses showed that it would be worthwhile to extend the range of items. A broader range of less intense and more intense items on the scale would discriminate amongst persons better.

The nature of technology and its role in higher education

Although some students perceived educational technologies in a similar technocratic manner to the World Bank, on the whole, students expressed a more diverse range of opinions concerning the nature of technology and its role in higher education. Australian and U.S. students were inclined to view the online technologies in an instrumental manner, whereas Malaysian students tended to focus on the inevitable infusion of technologies. In all three cultural groups, a number of students reported that they had little control over the use of the technologies, believing that technology was "taking over" and they had to adapt to it. This view was most commonly reported by Malaysian students, possibly because of a cultural tendency to adapt to change rather than trying to control change.

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Many students were concerned about the infusion of online learning in education, arguing that it fostered laziness and increased the distance between the teacher and student. Moreover, students were concerned about the solitude of online learning. This technological pessimism was particularly prominent among U.S. students and may indicate a general decline in people's belief in the potential of technology to bring about positive changes in education.

The fears and concerns raised by participants are at odds with the World Bank's optimism for innovative delivery; the high expectations for innovative delivery were not evident in all of the reported attitudes of respondents. This suggests that for students across diverse cultural groups online learning was not constructed as a necessary and positive component in education. The mismatch between rhetoric and the actual attitudes of end-users is likely to have a negative impact on the implementation of innovative delivery as conceptualised by the World Bank.

Overcoming existing barriers to education

Participants in all three cultural groups reported external constraints on their use of the online resources; however, the majority of external constraints were reported by Malaysian students. These findings confirm the World Bank's recognition that external constraints (such as computer infrastructure and connectivity) inhibit the use of technologies. Clearly, adequate access to appropriate technological infrastructure is an essential requirement for learning online.

However, the majority of constraints reported by participants were internal constraints. Both the qualitative and quantitative analyses revealed that students preferred face-to-face learning and generally found this more effective and enjoyable than learning online. Technical knowledge and experience, language barriers, institutional factors and socio-cultural factors all played a role in students' use and acceptance of technology for their learning. Overall, it was uncertain whether online technologies actually helped overcome existing barriers to education for students in the sample groups. In fact, although those in technologically privileged countries (Australia and the U.S.) generally reported ample opportunity to access the online resources, students did not use the technologies because they preferred face-to-face education. These findings directly contrast with the Bank's aims for innovative delivery because even when there were few physical constraints, students' internal constraints meant that the technology did not necessarily reduce existing barriers to education.

As we have seen, internal constraints were generally not recognised in the World Bank's documentation. It is possible that the Bank has focused on external constraints (such as computer hardware and software) because it is often easier to quantify, for example, how many computers have been installed and how many people have internet access than it is to measure qualitative progress in teaching and learning. The findings presented in this thesis suggest that simply increasing the availability of computer infrastructure and connectivity may not necessarily contribute to overcoming existing barriers to education unless consideration is given to the internal factors that influence a person's engagement with online learning.

Pedagogical implications

With respect to pedagogy, the findings suggested that the availability of online technologies (i.e. PowerPoint, online lecture recordings and email/discussion board) was no guarantee of student-centred learning processes. Analysis of the quantitative and qualitative data revealed that, overall, students did not use the online resources for student-centred learning. Students enjoyed the convenience of the online resources but tended to use them for rote-learning and memorisation. Moreover, even among students whose educational traditions have typically been student-centred (such as the U.S. and Australia), the reported attitudes showed that students did not always use the online resources in a way that fostered a student-centred approach. With respect to the online lecture recordings, for example, students believed that this did not foster the same degree of high level learning that could be achieved in face-to-face learning environments. Similarly, students tended to use the discussion board for administrative tasks and there was little evidence of students learning collaboratively online.

These findings contrast with the World Bank's aims, suggesting that the "revolution in information technology will provide unprecedented opportunities to . . . fundamentally rethink what should be learned and how" (World Bank, 1999 p. 2). The findings presented here cast doubt on the extent to which technology-mediated education can foster a student-centred approach to education. However, it is important to note that the World Bank is in fact a "bank" so much of its philosophy is geared towards issues such as 'achieving economies of scale', 'economic rationalism' and 'manpower development' and many other similar issues that are more easily quantified than the more qualitative aspect of education such as classroom process, the nature and value of student-teacher interactions, attitudes to learning, and so on. Nevertheless, as I pointed

out in Chapter 2, although "bankers" and "pedagogues" tend to look at education in quite different ways (Lauglo, 1996 p. 231), it is important for the success of any educational interventions to consider the potential impact and role of culture and pedagogy.

In comparison to Australian and Malaysian students, U.S. students' attitudes tended to be more student-centred, and yet the U.S. students reported that they used the online resources the least. U.S. students showed more awareness of the learning styles and educational tools that were most helpful, and in general, did not see the online resources as beneficial for their learning. This trend is noteworthy because it suggests that students' perceptions of the educational tools that facilitate deep learning would need to be altered if online resources were to be used within a student-centred framework. Thus, using online technologies for student-centred learning not only challenges existing conceptions of teaching and learning, but also challenges established views on the specific educational tools that can be used to facilitate high level learning.

Whether or not the online technologies are used within a student-centred framework or conversely, whether technologies are restricted to information acquisition largely depends on one's underlying assumptions about the aims and purposes of education. These assumptions are deeply embedded in cultural and educational traditions. To change these traditions to become more technocratic raises questions about the basic nature of education and ways in which educational practice should take place.

Moreover, given the magnitude of the pedagogical changes required for students and lecturers to use online resources within a student-centred framework, the question arises

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as to the possible consequences of altering established traditions of teaching and learning through the use of technologies. To what extent should individualized, flexible and autonomous learning be promoted as the preferred educational approach? And relatedly, to what extent should educators and students be expected to alter their view of the learning process to become more technocratic? In the absence of answers to these questions, innovative delivery might well be incompatible with genuine educational progress.

Contributions and Limitations

This research offered comparisons between the perspectives of students in two Western nations (Australia and the U.S.) and one non-Western nation (Malaysia). Comparisons between Australia and the U.S. provided insights on the similarities and differences between nations that, in social psychology literature, tend to be grouped together as "Western". In addition, this thesis provided insights on the commonalities and differences between students' attitudes from Western and non-Western nations.

By combining quantitative and qualitative methodologies in a mixed methods approach, this study provided a breadth and depth of information on students' attitudes to and use of online resources across cultural contexts. With respect to the quantitative methodology, this study offered a reliable and valid questionnaire that measured attitudes to and use of online resources. The use of the Rasch Measurement Model to validate the instrument, coupled with the use of the logits in statistical analyses, contributes to the psychometric literature in the application of the Rasch model in cross-cultural research.

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The findings from this study contributed to our understanding of how students from diverse cultural contexts perceive technology enhancements and how they use these technologies in their learning. It contributed to our knowledge on the factors that influence and constrain students' use of the technology. In addition, this study added to the emerging body of literature that questions the "inevitability" of technology as a necessary and positive component in higher education.

One methodological limitation of this study includes the use of surveys to study students' reported use of the technology, which may differ from their actual use. For example, as I observed in Chapter 4, people may not be equally articulate or perceptive in interview situations (Creswell, 2003). Furthermore, people from different cultural contexts may experience and interpret interview questions differently, and in some cultures the survey and interviewing process itself may seem strange to the interviewee (Newman 2000). Nachmias and Nachmias (1992) also noted that the mere presence of the researcher may bias the responses. In addition, some of the Malaysian students' attitudes were examined through behavioural intention rather than their actual use. These factors may limit the extent to which the findings may be interpreted and generalised.

To some extent, the authors' background may also have influenced the interpretations and conclusions of this study. Clearly, one's ethnicity, culture and educational background influence the lens through which the researcher interprets the data. In the case of the research presented here, the author's interpretation of the cross-cultural data was indirectly influenced by experiences of living and working in the U.S. and Kenya,

and visits to many other middle-income countries including Brazil, Indonesia and China, which may have provided greater validity to the understanding of the data. However, an outsider may still misinterpret another culture despite having some familiarity with it and a considerable degree of cross-cultural sensitivity.

Other limitations of this study relate to the high degree of ethnic variation in the student population within each university selected for study makes it difficult (if not impossible) to characterise and describe students as homogenous groups of either "Australian", "Malaysian" or "U.S." students. Thus, generalisations of the findings to the broader population in each country may not be possible. This limitation also relates to the sample size, which also limits the extent to which the results can be generalised to the larger population. In addition, the number of participants was too small to be representative of the population in each country.

Furthermore, research into technology-mediated education is difficult because one is always dealing with a 'moving target'. For example, the collapse of telecommunication costs, the massive downward pressure on hardware prices due to mass production and the surge in free and open software mean that the actual technologies adopted by end-users are continually changing. However, the trends that emerged from the analyses in this study are likely to have relevance for university institutions as well as aid organisations such as the World Bank, particularly with respect to the development of future policies on the role of technology in education and the pedagogical applications of such technology.

Directions for Future Research

The findings from this thesis provide a number of possible directions for future research. In this study, many Malaysian students' reported their behavioural intentions rather than their actual use. Thus, further research is needed to examine Malaysian students' actual (reported) attitudes and use. Future studies might also determine the extent to which Malaysian students' study habits are moving away from traditional ways of learning.

In addition, it would be beneficial to develop a more thorough understanding of the specific issues faced by lecturers in developing innovative units online, given the constraints on lecturers' time and willingness to create student-centred online units. In particular, the specific issues and constraints experienced by Malaysian lecturers in using online resources for teaching and learning could be explored further.

Future research might also focus on students in developing countries and their actual use of online resources. With the rapid modernisation of cities like Nairobi in Kenya, it may be possible to study a wide range of students' interaction with online resources that would not have been possible some years ago.

Finally, it must be noted that the governments of the world are showing interest in assessing the quality of their technology-mediated education programmes in relation to other countries because it is believed that the learning achievement of today's students provides a good predictor of future national economic performance. Several large scale cross-national studies of the use of technology-mediated education programs are currently underway. For example, the International Association for the Evaluation of

Educational Achievement (an independent, international cooperative of national research institutions and governmental research agencies) conducted studies (in 2006) on how ICT is used in education and how it supports and enhances pedagogical practices (IEA, 2006). This not only illustrates the global interest and importance of research in this area, but also provides useful springboards for future research directions.

Applications of Findings

Based on the findings outlined above, the following section describes a number of possible applications relating to the future direction of innovative delivery for higher education.

Develop a questioning stance towards technology

The World Bank presents the use of technologies as a necessary and positive component in higher education. According to the Bank, the infusion of educational technologies in developing countries is an "inevitable" process and assumed to educational progress. This construction of technology leaves little opportunity to consider of the socio-cultural and pedagogical processes that may be impacted. Furthermore, it does not recognise the educational processes, cultures and values that may be altered by the promotion of innovative delivery. By maintaining a technocratic approach to education, the Bank's conceptualisation of innovative delivery is likely to reflect an ethnocentric approach to development.

It is the author's contention that a more questioning, reflective approach towards the use of educational technologies is needed. Although the World Bank has clearly stated its preferred pedagogical approach for the use of technology, these intentions do not necessarily translate into the actual practices of students and lecturers. A more realistic assessment of the potential of educational technologies is needed and particular attention must be given to how socio-cultural practices may be altered by technological innovations.

An alternative to the Bank's technocratic view might be to shift the focus onto human values, rather than primarily on the economic utility of education. The implementation and development of technological innovations in education should be subjected to debate and discussion, rather than simply taken-for-granted as an inevitable infusion into society and education. By giving consideration to contending perspectives and attitudes, future policies on innovative delivery may avoid or minimise a normalising effect that encourages the homogenisation of pedagogical approaches.

Technology adoption

This study showed that attitudes to online learning vary considerably across different cultural contexts. For example, Malaysian students held the most positive attitude to online learning (as compared to U.S. and Australian students), but were most constrained by inadequate technological infrastructure and technical experience. U.S. students, by contrast, had the least external constraints and yet were not as positive in their attitudes to online learning as either the Australian or Malaysian students. This

variation in people's willingness and capacity to embrace online learning indicates that the adoption of technology is both contextual and situational.

For example, Malaysian students may require direct instruction on the specific skills required for online navigation. This might be needed even if the necessary technological infrastructure was available. Even Australian and U.S. students, who generally reported adequate access to technology, may still require teaching on the basic procedures on how to use the online resources. Thus, solving technological infrastructure issues may not necessarily increase access to education through online learning and the Bank's overly simplistic view of technology adoption may in fact eclipse the situational nature of becoming technologically savvy.

Using online technology for student-centred learning

This study illustrated the complexity of technology adoption, particularly with respect to adapting online learning for student-centred learning. Simply making the internet and related course material available to students online does not necessarily mean that students will use them in the manner intended. Students' preconceived ideas about what constitutes teaching and learning directly influences how the online resources are used. For example, in this study students tended to view their teacher as one who transmits information rather than facilitates their construction of knowledge. Similarly, across all three cultural groups, the lecturers generally did not encourage students to explore the web and critically evaluate information. It follows then that if innovative delivery is to be used as currently proposed by the World Bank, implementation must be accompanied by direct teaching about the basic procedures on how to use technology,

including hypertext and the virtual learning environment. More specific guidance may be needed for teachers to enable them to move away from a teacher-centred role when using online resources. Furthermore, current educational traditions are being challenged by the paradigm of teaching and learning embodied in online learning. This is particularly evident with respect to the lecturers' view of the educational tools that can facilitate high level learning and critical thinking. Additional teacher training may be needed to demonstrate the variety of high-level applications of technology in higher education.

Conclusion

In this thesis I examined three central assumptions put forward by the World Bank concerning innovative delivery for higher education. I considered these assumptions in three different cultural contexts by examining the perspectives of students' and their lecturers in Australia, Malaysia and the United States. I argued that the World Bank underestimates the complexity of innovative delivery and more attention must be given to the influence of culture and pedagogy on the effectiveness of innovative delivery. While documents such as the ES99 and the ESSU might well be critically important documents in terms of shaping future educational reform in developing countries, the current "technological fix" view coupled with the prevailing belief in the power and potential of technology fails to recognise the complexity of technological adoption. This, in effect, obscures the impact of technology on cultural and pedagogical values, aims and practices. Thus, despite the apparent good intentions embedded in the ES99, the World Bank's policy on innovative delivery as it currently stands may not necessarily improve educational systems in developing countries.

Clearly, there is much that still needs to be learned about the issues that may arise when technology-mediated education is used as a strategy for educational reform. This thesis serves only to point out the limited nature of innovative delivery as a strategy for addressing educational needs. However, it is hoped that this thesis will contribute to an ongoing discussion on how innovative delivery can be productively utilised without homogenising cultural and pedagogical differences in educational practice.

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