Web-Based Learning: Aspects of Cultural Differences

C. Bauer, K. L. Chin and V. Chang

School of Information Systems
Curtin University of Technology
Kent Street, Bentley
Western Australia 6102

Abstract-**This paper examines the question: How do cultural differences influence students' perceptions of Web-based learning? Research on cultural differences by Hofstede [1] [2] is used as a foundation to study students' perceptions of Web-based learning. A survey of an on-line course has been conducted, linking the students' cultural background to usage patterns, attitudes towards Web-based learning in tertiary education and students' learning experiences. The outcome of this research enables, and urges, developers to tailor their Web-based courses for their target audience and to consider cultural diversity.**

I. INTRODUCTION

There has been a steady increase in the use of the Internet and in particular the World Wide Web for tertiary education. The convenience and flexibility of this mode of delivery has attracted many students who are unable to attend on-campus courses due to work commitment, busy life styles and simply not being able to attend on-campus lectures due to distance. However, because of the remoteness and feeling of isolation, many students do not like the on-line learning experience [3]. Consequently, most on-line education offerings carry the theme of "connected not isolated" [4] and "learning without distance rather than learning at a distance" [5].

On-line education developers and researchers have already proposed a variety of ideas and theories to overcome these inherent shortcomings of Web-based instruction. The Web as a communication medium has strong potential for interactivity and this echoes Jonassen's [6] constructivist model where he stresses the need for collaboration among learners (compare Edelson, Pea and Gomez [7]). According to Boston [8], access to the Web is a victory for educational opportunity equity for groups who are disadvantaged to achieve the goal of equal outcomes. Reeves and Reeves [9] state that Web-based learning should accommodate diverse ethnic and cultural background among the learners expected to use the Web-based materials. This research investigates one particular aspect of on-line education equity: the effects of the cultural background of learners and their perception on Web-based learning.

II. CONSTRUCTIVIST LEARNING AND THE WEB

Early approaches to constructivism in classroom learning environments focused on the learner as an individual, and learning in isolation from other learners. Early constructivism does not allow the sharing of resources and communication between learners [7]. To overcome learning in isolation, a virtual learning environment model was proposed by Edelson, Pea and Gomez [7]. In this model, they viewed the constructivist approach where a learner is actively engaged in interaction with a variety of resources and developing his or her own understanding through experimentation, experience and guidance. Jonassen's [6] constructivist model of learning with technology highlights factors such as articulation, negotiation and exploration that can be easily supported with Web-based learning environments.

The constructivist approach and Web-based education enhance each other, with constructivism providing on-line learning with a sound pedagogical paradigm and the Web overcoming the "constructivist learning isolation". There are now increasing opportunities by using the Web in the process of learning to connect individual learners. Sharing and using resources and materials also becomes the product of learning. There is a growing recognition in higher education of the value of learning environments that facilitate learners' active participation in Web-based learning process.

Finder and Raleigh [10] explains four ways in which Web applications could be used in a course:

1) *Informational*,

2) *Supplemental*,

3) *Dependent, and*

4) *Fully developed.*

Informational use is defined as making course information, such as course outline and assignment descriptions, available on the Web. *Supplemental* use requires students to use the Web to complete part of the course. The learning materials generally include links to related secondary sources. In *dependent* use most learning materials already exist on the Web and students (partly) use the Web to complete course assignments. In *fully developed* use the entire course is delivered via the Web. This is deemed as offering the course totally on-line without students and teachers meeting face-to-face.

A. Roles of The On-Line Teacher

The role of the teacher either in a classroom face-to-face teaching or on-line setting is to ensure that some type of educational process occurs amongst the learners involved. In the traditional classroom setting, the teacher role typically imparts knowledge to learners [11]. In the on-line Web environment, the role of the teacher becomes that of an educational facilitator [12]. As a facilitator, the teacher provides guidance and allows students to explore the course material as well as related materials without restriction. A model using the Web as a learning environment is described in Bauer et al. [13].

Collins and Berge [14] categorise the tasks and roles of the on-line teacher into four areas:

1) *Pedagogical*,

2) *Social*,

3) *Managerial*, and

4) *Technical*.

Collins and Berge [14] described *pedagogical* tasks as revolving around educational facilitation. The *social* functions are mainly concerned with the promotion of a friendly social environment that is needed in the process of on-line learning. The *managerial* aspects of on-line learning involve setting agendas, objectives, rules and decision-making norms. Finally, the *technical* aspects focus on the teachers' proficiency with the use of the technology.

On-line teachers must ensure that they themselves are comfortable with using this technology to transfer knowledge to students. This is supported by Collins and Berge's [14] view that teachers must first become proficient and comfortable with the technology infrastructure to ensure the comfort of the learners.

B. Roles of The On-Line Learner

A successful learner in an on-line environment must be active. The roles of the on-line learners extend to knowledge generation, collaboration, and process management [15]. These functions are emphasised to a much lesser extent in traditional learning environments. However, in on-line learning learners are responsible for actively seeking solutions to problems confined within the knowledge area being studied with guidance from the teachers (or other facilitators). They are expected to reflect on problems and questions presented by the teacher and/or other students.

Students in the on-line learning environment are learning collaboratively and cooperatively. Learners need to work together in order to generate deeper levels of understanding of the course material. Additionally, students are also expected to share the resources and other materials that they are finding with other learners. In the role of process management, students are required to participate with minimal guidelines, interact with one another and speak up when the discussions are moving into an uncomfortable zone. Students must be willing to speak out when they are offended and to voice their opinion [15].

III. CULTURE ISSUES AND THE WEB

The Web learning environment is potentially a powerful arena in which new practices and new relationships can make significant contributions to learning. However, attention needs to be paid to on-line learning processes. Students in face-to-face classroom settings see and work with one another and get to know each other well through the learning process. For learning to be successfully delivered on-line, the learning process on the Web needs to be well facilitated. Naturally, these requirements become even more critical in culturally diverse learning environments.

Hofstede [1] conducted a study on cultural differences involving face-to-face teaching and learning. Hofstede's [1] four dimensions of culture are used as a foundation in this research. Further research on cultural issues of using computer-aided learning (CAL) was conducted by Sanders and Ayayee [16]. Recent cross-cultural studies on on-line learning have also been conducted by Slay [17] [18].

A. Hofstede's Four Dimensions (4-D) Model

According to Hofstede [1], culture is defined as a collective programming of the human mind which distinguishes the members of one group of people from others. Cultural differences between people of different nations and societies have existed for many centuries and are stable over the long term. For example, Chinese culture is based on the teachings of Confucius while Western thinking owes debt to Greek philosophers such as Plato, Socrates or Aristotle [2].

Hofstede [1] identified four dimensions of cultural differences:

1) *Power distance:* Power distance defines the extent to which the less powerful in a society accept inequality and consider it as normal.

2) *Individualism and Collectivism:* Individualism describes societies in which ties between individuals are loose and people are expected to look after themselves and their immediate families. Collectivism describes societies in which people from birth onwards are integrated into strong, cohesive groups, which throughout their lifetime continue to protect them in exchange for unquestioning loyalty.

3) *Masculinity and Femininity:* Masculinity pertains to societies in which gender roles are clearly distinct. In masculine society, men are supposed to be assertive, ambitious and competitive, while women are supposed to be tender. Femininity pertains to societies in which social gender roles overlap. In feminine societies, men and women are supposed to be equally modest and tender.

4) *Uncertainty Avoidance:* Uncertainty avoidance defines the extent to which people within a culture are at unease with situations which they perceive as unstructured, unclear, or unpredictable. They therefore try to avoid such situations by maintaining strict codes of behaviour and a belief in absolute truths. Cultures with strong uncertainty avoidance are active, aggressive, emotional, compulsive, security-seeking, and intolerant; cultures with a weak uncertainty avoidance are contemplative, less aggressive, unemotional, relaxed, accepting of personal risks, and relatively tolerant.

Using Hofstede's [1] 4-D model (as shown in Table I), Australia (as a proxy for Anglo-Saxon countries) and the four Asian countries of Hong Kong, Indonesia, Malaysia and Singapore differ in two of the four culture dimensions - Power Distance and Individualism versus Collectivism. This echoes Hofstede's [2] view that many East Asian and South-East Asian countries are characterised by high power distance and many countries in Europe and North America are characterised by low power distance. According to Hofstede [1], these cultural differences have implications in teacher-student interactions in the classroom. The aim of this research

is to investigate whether these consequential implications still exist in on-line learning environments.

TABLE I
CULTURAL DIFFERENCES BETWEEN AUSTRALIA AND ASIAN COUNTRIES

Countries	Society's Culture Characteristics
Australia	• Small power distance • High individualism • Weak uncertainty avoidance • Masculine
Asian Countries (Malaysia, Singapore, Indonesia, Hong Kong)	• Large power distance • Low individualism • Weak uncertainty avoidance • Masculine

B.   The Implications of Power Distance on Web-Based Learning

According to Hofstede [1] [2], power distance as a cultural difference dimension, has numerous impacts on teacher-student interaction in classroom. In examining these impacts closer, Table II lists direct implications on Web-based learning situations for Australian and Asian students. These implications are explained in more detail following Table II.

TABLE II
THE EFFECT OF POWER DISTANCE ON TEACHING AND LEARNING [1] [2]

Small Power Distance Societies	Large Power Distance Societies
1. Stress on impersonal "truth" which can in principle be obtained from any competent person	1. Stress on personal "wisdom" which is transferred in the relationship with a particular teacher (guru)
2. Student-centred education (premium on initiative)	2. Teacher-centred education (premium on order)
3. Effectiveness of learning related to amount of two-way communication in class	3. Effectiveness of learning related to excellence of the teacher

1) Asian students seem to place more emphasis on learning directly from the teacher who they see as a 'guru'. The implication in Web-based learning environment for the Asian students is that face-to-face class contacts are often reduced or replaced by electronic communication, such cutting the direct connection to the 'guru'.

2) Australian students, who are more accustomed to the concept of student-centred education might find it easier to accept Web-based learning environment than their fellow Asian students who are more accustomed to teacher-centred education.

3) Two-way communication is a very important part of Web-based learning environment where computer-mediated-communication (CMC) plays a vital role in students' learning. Asian students generally are more reluctant to speak up in class because they believe that as students they do not have sufficient knowledge to have an opinion, or their opinion is of less significance compared to that of their teachers.

C.   The Implications of Individualism on Web-Based Learning

The effect of individualism, according to Hofstede [1], also has some impact in the interaction between teacher and students in the classroom, as shown in Table III.

TABLE III
THE EFFECT OF INDIVIDUALISM ON TEACHING AND LEARNING [1] [2]

Collectivist Societies	Individualist Societies
1. Positive association in society with whatever is rooted in tradition	1. Positive association in society with whatever is "new"
2. Large classes split socially into smaller, cohesive subgroups based on particularistic criteria (eg. ethnic affiliation)	2. Subgroups in class vary from one situation to the next based on universalistic criteria (eg. the task "at hand")
3. Education is a way of gaining prestige in one's social environment and of joining a higher status group	3. Education is a way of improving one's economics worth and self-respect based on ability and competence

1) Since Asian societies have more positive association with whatever is rooted in tradition, the notion of innovative teaching method such as the incorporation of the Web might not be well received by the Asian students.

2) It appears that Asian students like to form small study groups with other Asian students. Usually those who come from the same country or speak the same language may place individual student in isolation and this might affect the student's performance.

3) Asian students see education as a way of gaining prestige in one's social environment and therefore see it as a worthwhile investment of time and money. However, by replacing class contact with Web-based learning and communication, some Asian students might feel that they are not "getting value for money".

IV. RESEARCH PLAN AND METHODOLOGY

Curtin University of Technology in Western Australia is embracing the idea of using the Internet to provide a flexible learning environment for its students [19]. Curtin University has a very diversified campus population, with its international students population being the fourth highest amongst all Australian universities.

An Electronic Commerce unit about Internet Functions and Facilities was chosen as the target of this study. This unit is offered to all students across the University but the majority of its enrolments are students from Curtin Business School (CBS). Like many other CBS units, this unit has a high enrolment (over 65%) of international students. This unit was first introduced in 1995 and, since 1997, was offered in two modes, dependent and fully developed modes, according to Finder and Raleigh's framework as introduced in section II [10]. The on-line learning material of the unit was developed using World Wide Web Course Tools (WebCT) [20] [21]. The unit consisted of specifically designed on-line reading materials, links to external on-line resources, on-line groupwork on case studies, discussion forum in bulletin boards and on-line examinations.

This unit was selected for this study because of the high number of international students. This study will allow us to look into how students of different cultural background perceived and received Web-based learning. To evaluate this, a questionnaire was distributed to all students enrolled in the unit in semester 2, 1998. To ensure maximum returns the survey was administered during the major assignment on-line testing session.

A total of 196 questionnaires were returned in which 157 could be assigned to either the Anglo-Saxon or the Asian cultural groups according to proximity clustering within Hofstede's [1] model of cultural differences. The Anglo-Saxon group comprised 52 students (33%), and 105 international students from the Asian region (67%). Besides Australia (41 students), countries included in the Anglo-Saxon group are England (5 students), Northern Ireland (2), New Zealand (2), and Scotland (2). The home countries of the Asian students are Singapore (37 students), Malaysia (36), Indonesia (19), Hong Kong (5), India (2), Philippines (1), Korea (1), Taiwan (2), and Thailand (2). These are summarised in Table IV.

TABLE IV
COUNTRIES OF ORIGIN

Anglo-Saxon Group	Asian Group
Australia (41)	Singapore (37)
England (5)	Malaysia (36)
Northern Ireland (2)	Indonesia (19)
New Zealand (2)	Hong Kong (5)
Scotland (2)	India (2)
	Philippines (1)
	Korea (1)
	Taiwan (2)
	Thailand (2)
Total: 52	**Total: 105**

The demographics of the student population as reflected by valid questionnaires are summarised in Table V. These factors could potentially bias the results of the questionnaire. In particular age and gender, have already been identified as irrelevant to the success or failure of Web-based learning in previous empirical studies [22]. However, the other demographic variables have been tested for significance against the perception of the usefulness of the particular Web-based learning unit (Pearson Chi-Square test), and none of them yielded a high significance.

TABLE V
DEMOGRAPHICS OF STUDENT POPULATION

Variables	%
Gender	
Female	63%
Male	37%
Age	
36 years and above	6%
31 - 35 years	3%
25 - 30 years	19%
24 years and under	72%
Academic workload	
Full-time student	78%
Part-time student	22%
Academic level	
Undergraduate	81%
Postgraduate	19%
Experience	
Prior involvement in other Web-based learning	27%
No prior involvement	73%

Table VI summarises some demographic and educational background information in a comparison between Anglo-Saxon and Asian students in the unit. For both groups the sample is male dominated, and the average of the student age is around the mid twenties. The numbers about study background are very similar for both groups, as reflected in their workload (by comparison of full-time to part-time students), the number of postgraduate students surveyed and their experience of Web-based learning.

TABLE VI
DEMOGRAPHIC COMPARISON OF ANGLO-SAXON AND ASIAN GROUPS

Variable	Anglo-Saxons	Asians
Gender (% female)	27%	41%
Age (years)	25.7	23.9
Workload (% full-time)	71%	82%
Academic level (% postgraduate)	18%	20%
Experience with Web-based learning	31%	25%

V. RESEARCH FINDINGS

A. Overall Usefulness of Web-Based Learning

The overall perceived usefulness is without doubt one of the most important measures for the success of Web-based learning. The question on the questionnaire regarding this read as follows:

Have you found Web-based learning in this unit useful (Yes/No)?

Only a very small number of students answered disapprovingly to this question. The difference between the two cultural groups is only marginal with a two-sided, asymptotic significance for the Pearson Chi-Square test of 0.776. Based on this result it can be suggested that Web-based learning is not particularly unpopular, regardless of their cultural background.

B. Perceptions of Web-based Learning

The next section of the questionnaire examined the students' perception of the role of Web-based learning. Table VII lists the most important issues. For each question the answers for each of the cultural groups are compared and Pearson's Chi-Square is computed to investigate the relationship between the cultural background and the respective variable. As can be seen from Table VII only one variable shows a relationship at a significant level with the culture of the student. More Asian students are attracted to Web-based learning because it is an innovative idea for facilitating learning. While 80% of the Asian students agreed or strongly agreed to this statement, only 53% of the Anglo-Saxon students indicated likewise. It is encouraging to note this positive attitude from the Asian students as this result contradicts with Hofstede's [1] views of Asian students as collectivist societies (see Table III, item 1) in a classroom setting.

TABLE VII
COMPARISON OF THE STUDENTS' PERCEPTIONS OF WEB-BASED LEARNING AND CULTURAL BACKGROUND WITH PEARSON'S CHI-SQUARE TEST

Variable	Pearson
Positive feeling about Web-based learning.	0.444
Successful experience with Web-based learning.	0.073
Like to see more Web-based learning.	0.209
Prefer subject material on the Web.	0.591
Web-based learning is attractive as an innovative idea.	**0.007**
Web-based learning can substitute for traditional lectures.	0.109
Support from peers about Web-based learning.	0.453

C. Access and Usage Patterns of the Web-Based Learning Materials

While the perceptions of Web-based learning did not show very different opinions based on the cultural background, the actual usage of the Web-based material shows more significant relationships. Although the time spent when accessing the Web-based material did not vary significantly between the two groups, the overall number of accesses did. This difference can be attributed to a large extent to a few outliers in the Asian group with very few accesses and should therefore not be overestimated. More robust than this variable is the result of the question for the student's perception of his or her own knowledge to use the Web. The Anglo-Saxon student group seems more confident about using Web technology with 90% agreeing or strongly agreeing to the corresponding question, compared to only 75% of the Asian students. This higher confidence rate is reflected even stronger in the question on difficulties with navigation in Web-based learning material. While 85% of the Anglo-Saxon students agreed or strongly agreed that they had only few difficulties, in contrast it is a case for only 55% of the Asians. Finally, the question for the familiarity with search engines for searching information on the Web showed a similar result, but a weaker significance in the relationship to the cultural background. Overall, it becomes clear from the collected data, that Anglo-Saxon students in the sample felt more confident about using Web-based technology for learning.

TABLE VIII
COMPARISON OF THE ACCESS AND USAGE PATTERNS OF WEB-BASED LEARNING MATERIAL AND CULTURAL BACKGROUND WITH PEARSON'S CHI-SQUARE TEST

Variable	Pearson
Number of accesses to Web-based materials.	**0.040**
Time spent with the Web-based material when accessed.	0.329
Sufficient knowledge to use the Web.	**0.006**
Adequate technical assistance.	0.138
Difficulty with navigation in Web-based material.	**0.000**
Familiarity with Web search engines.	**0.042**

D. Perception of Web-Based Discussion Groups

Although there was no indication for differing preferences (see Table IX) for choosing electronic over face-to-face communication (eg., in the E-mail contact with the lecturer), the satisfaction with the on-line discussion groups and bulletin boards showed some cultural differences with weak significance. 71% of Anglo-Saxon students agreed or strongly agreed with the idea of using discussion groups as a good way to discuss problems amongst students, compared to only 68% in the Asian group. Interestingly, this satisfaction is not accompanied by an increased usage as Asian students tend to check and post messages more frequently. 46% agreed and 36% strongly agreed to have frequently checked and posted messages in the Asian group, whereas 38% and 33% agreed and strongly agreed respectively in the Anglo-Saxon group. Overall the numbers are not convincing enough to provide a clear picture, but on-line discussion groups are definitely an important issue as far as the impact of the cultural background on the perception of Web-based learning is concerned.

Variable	Pearson
Preference for E-mail contact with lecturer	0.864
Satisfaction with on-line discussion groups	**0.045**
Frequency of checking discussion messages	**0.014**
Frequency of posting discussion messages	**0.005**

VI. CONCLUSION

Based on the research findings, it can be summarised that Web-based Learning is popular amongst Asian and Anglo-Saxon students. Both groups of students perceived Web-based Learning as an innovative idea to facilitate learning. It must also be noted from the findings that the Anglo-Saxon group of students seems more confident in using the Web-based materials. Also, the number of on-line access shows a much higher percentage to the Anglo-Saxon group. Asian students recorded fewer access to the Web-based materials. The Anglo-Saxon group also showed that they had fewer difficulties in navigating through the on-line materials as compared to the Asian students. This finding, thus, supports Hofstede's [1] views that Anglo-Saxon students are more accustomed to student-centred situations whereas Asian students prefer a teacher-centred approach (see Table II, item 2).

The findings also indicated that both groups of students are satisfied with e-mail communication, on-line discussion and discussions on bulletin boards. It is encouraging to notice that whilst Asian students are generally more reluctant to speak up in a classroom environment (see Table III, item 3), they found that communicating on-line is less threatening and they are more willing to participate using this medium.

The results of this study are of great importance to educational institutions, especially to those who are offering courses to students from different countries. The findings presented in this paper encourage further research into the impact of cultural differences on Web-based education.

REFERENCES

[1] G. Hofstede, "Cultural differences in teaching and learning," International Journal of Intercultural Relations, vol. 10, pp. 301-320, 1986.

[2] G. Hofstede, Cultures and organisations: Software of the mind. London: McGraw-Hill, 1991.

[3] M. Simonsen, "Does anyone really want to learn at a distance?," Techtrends, vol. 40, 1995.

[4] V. Lowery, "Connected Not Isolated," presented at World Computer Congress: Teleteaching 98, Vienna/Austria and Budapest/Hungry, 1998.

[5] P. Duchastel, "A Web-Based Model for University Instruction," Journal of Educational Technology Systems, vol. 25, pp. 221-228, 1997.

[6] D. Jonassen, "Thinking Technology: Towards a Constructivist Design Model," Educational Technology, pp. 34-37, 1994.

[7] D. Edelson, D. Pea, and L. Gomez, "Constructivism in the Collaboratory," in Constructivist Learning Environments: Case studies in Instructional Design, B. Wilson, Ed. New Jersey: Educational Technology Publications, 1996, pp. 151-164.

[8] K. Boston, "Continuity and Change in Australian Schools," Journal of the Australian College of Education, vol. 23, 1997.

[9] T. C. Reeves and P. M. Reeves, "Effective Dimensions of Interactive Learning on the World Wide Web," in Web-Based Instruction, B. H. Khan, Ed. New Jersey: Educational Technology Publication, 1997, pp. 59-66.

[10] K. Finder and D. Raleigh, "Establishing a Framework Useful for Developing Web-Based Assignment in K-12 Education.," presented at Society for Information Technology & Education SITE '98, Washington DC, 1998.

[11] A. Relan and B. B. Gillani, "Web-Based Instruction and the Traditional Classroom: Similarities and Differences.," in Web-Based Instruction, B. H. Khan, Ed. New Jersey: Educational Technology Publication, Inc., 1997, pp. 41-46.

[12] L. Sherry and B. Wilson, "Transformation Communication as a Stimulus to Web Innovations.," in Web-Based Instruction, B. H. Khan, Ed. New Jersey: Educational Technology Publication, Inc., 1997, pp. 67-73.

[13] C. Bauer, J. Berkhout, V. Chang, K. L. Chin, B. Glasson, and J. Tauber, "Exploring On-Line Education: A Research Framework," presented at Teaching and Learning Forum, University of Western Australia, 1999.

[14] M. Collins and Z. Berge, "Facilitating Interaction in Computer Mediated Online Courses," presented at FSU/AECT Distance Education Conference, Tallahasee, Florida, 1996.

[15] R. M. Palloff and K. Pratt, "Effective Teaching and Learning in the Virtual Classroom.," presented at World Computer Congress: Teleteaching 98, Vienna/Austria and Budapest/Hungary, 1998.

[16] M. Sanders and E. Ayayee, "Engaging Learners in Computer Aided Learning: Putting the Horse Before the Cart.," presented at ASCILITE'97, Perth, Australia, 1997.

[17] J. Slay, "Using the WWW to create an effective cross-cultural learning environment.," presented at World Computer Congress: Teleteaching 98, Vienna/Austria and Budapest/Hungary, 1998.

[18] J. Slay, "Higher Education Online: Cross-Cultural Reflections on The Chinese Situation," presented at AusWeb99, Sydney, Australia, 1999.

[19] I. Reid, "Towards a Flexible, Learner-Centred Environment," Curtin University of Technology, Perth, Draft Discussion Paper, 1999.

[20] M. W. Goldberg, "World Wide Web - Course Tool: An Environment for Building WWW-Based Courses," presented at the Fifth International World Wide Web Conference, France, 1996.

[21] M. W. Goldberg and S. Salari, "An Update on WebCT (World-Wide-Web Course Tools) - a Tool for the Creation of Sophisticated Web-Based Learning Environment," presented at NAUWeb '97 - Current Practices in Web-Based Course Development, Flagstaff, Arizona, 1997.

[22] C. Bauer, "On-line Education: Students' Perceptions of Web-Based Teaching (Poster Presentation)," presented at CollECTeR Conference on Electronic Commerce (CollECTeR'98), University of Wollongong, Sydney, Australia, 1998.