M O N A S H U N I V E R S I T Y

Computing Education Research Group (CERG)

Faculty of Information Technology

Technical Report

October 2008

Understanding Cultural Influences on students' approaches to learning and learning styles

Roongrasamee Boondao
John Hurst
Judy Sheard

Table of Content

1 Introduction

Human learning processes are very complicated and are influenced by various factors. In many institutions efforts are being made to make learning available at any time and place. One of the most popular ways is by providing the courseware through e-learning. Instructors in almost every field of study are trying, with varying degrees of success, to implement the concept of e-learning for their courses. Many groups of researchers have put effort into studying, surveying, designing and implementing programs to develop e-learning. Those efforts have shown that the new methods used in e-learning have the ability to be more interactive, provide a more convenient way to communicate between lecturers and students, and provide more suitable courseware for the students.

Despite such efforts many students, particularly among those learning through technology, drop out from their courses [1], [2], [3]. What is wrong with the design of e-learning? Do the researchers overlook very important factors that have influence on human learning?

There are different characteristics among students who come from different cultures and countries. Students from Eastern countries seem to be more passive compared to the students from Western countries [4], [5], [6]. Chinese and Vietnamese students tend to do well in studying [7], [8], [9]. Do culture and race influence learning success? In the learning environment, students who come from different ethnic groups and cultures require different support. "It is not possible, in the view of some scholars, to create a model of the good teacher without taking issues of culture and context into account" (p. 36) [10]. There is very little research on ethnic and cultural influence on human learning [11], [12].

The main purpose of this research is to provide design principles for a personalized e-learning system that takes into consideration aspects of cultural influences on human learning. Consideration of such influences may be essential if we wish to design a system that is suitable for students from different backgrounds.

2 Methodology

The study used a survey method with a paper questionnaire to gather information about the cultural educational backgrounds, approaches to study and learning styles preferences of a group of an Australian university's students.

2.1 Sample

For the purpose of this study, the term "eastern" is used to indicate Asian countries, such as China, Vietnam, Malaysia, Indonesia, Korea, and the countries influenced by Asian culture value systems. The term "western" is used to indicate the countries influenced by European culture value systems. The participants were 185 undergraduate students in Information Technology and Systems of an Australian university who volunteered to take part in the research. There were 131 eastern students (Chinese, Vietnamese, Malaysian, Indonesian, Cambodian, Korean, Indian, Thai and other eastern students) and 54 western students (Australian, British, and other western students).

2.2 Questionnaires

The questionnaire was divided into three sections. Section 1 was designed to obtain biographical and cultural educational tradition information. Section 2 comprised the 42 items of the Study Process Questionnaire (SPQ) developed by Biggs [13]. The SPQ is a questionnaire used to assess the student approaches to learning and studying. Table 1 gives a description of the three important approaches to learning (surface, deep and achieving) and their constituent motives and strategies as described by Biggs.

TABLE 1 Motive and Strategy in approaches to learning and studying (p.10) [14]

Approach	Motive	Strategy
Surface	Surface motive (SM) is to meet requirements minimally; a balancing act between failing and working more than is necessary.	Surface strategy (SS) is to limit target of study to bare essentials and reproduce them through rote learning.
Deep	Deep motive (DM) is intrinsic interest in what is being learned; to develop competence in particular academic subjects.	Deep strategy (DS) is to discover meaning by reading widely, inter-relating with previous relevant knowledge, etc.
Achieving	Achieving motive (AM) is to enhance ego and self-esteem through competition; to obtain highest grades, whether or not material is interesting.	Achieving strategy (AS) is to organize one's time and working space; to follow up all suggested readings, schedule time, behave as 'model student'.

Section 3 comprised the modified 33 items of the Index of Learning Styles (ILS) developed by Richard Felder and Barbara Soloman [15]. The ILS is a questionnaire designed to assess learning styles preferences on four scales, *sensing-intuitive, visual-verbal, active-reflective,* and *sequential-global*. In this research, the scales of sensing-intuitive were discarded because of practical constraints. Table 2 illustrates the dimensions and definitions of ILS.

TABLE 2 Dimensions and definitions of ILS

Dimensions	Definitions
Active	Learn by doing it, enjoy working in groups
Reflective	Learn by thinking about it, prefer working alone
Visual	Prefer pictures, diagrams and flow charts
Verbal	Prefer written and lecture
Sequential	Step by Step
Global	Big Picture

2.3 Procedure

The questionnaire was administered to students from all years of the Bachelor Information Technology and Systems degree. Students were assured of their anonymity and a written consent to answer the questionnaire was obtained.

3 Results and Discussion

3.1 Demographic data

The results showed that the majority of participants (71%) were eastern students with 40 percent being Chinese. The 29 percent who were western students included 21 percent who were Australian. About eighty percent were aged between 18 and 24 years and 17 percent were aged between 25 and 34 years. Only 1.6 percent were aged between 35 and 44 years. With regard to gender, 82 percent were male and 17 percent female. Information about the sample, in terms of ethnic background group, is summarized in Table 3.

TABLE 3 Ethnic background group data

Ethnic background group	Frequency (respondents)	Percent (%)
Eastern	**131**	**71.0**
Chinese	74	40.0
Vietnamese	10	5.4
Malaysian	8	4.3
Indonesian	6	3.2
Indian	9	4.9
Korean	2	1.1
Cambodian	5	2.7
Other Asian	17	9.1

Western	**54**	**29.0**
Australian	38	20.5
British	2	1.1
Other Western	13	7.0

3.2 Educational cultural background of the participants

The results showed some of the differences in the characteristics of eastern students and western students. From the survey results, 46 percent of eastern students indicated that their parents or family feel that high achievement in their education brings honor and prestige to the family while only 19 percent western students indicated the same. A number of the western students stated that their family wants them to do their best but do not feel that it brings honor and prestige to the family. About 83 percent of eastern students felt that their cultural educational tradition was teacher-centered which was higher than the percentage for western students (about 62 percent). Seventy six percent of eastern students claimed that they treated their teachers with respect while the majority of western students stated that they treated their teachers basically as equals (47%). About 60 percent of eastern students identified that rote learning was the activity that characterized the educational tradition in their culture while criticism and/or discussion was the activity in the western students' educational tradition (72%). In addition, in situations where the students disagree with somebody in their class, many of eastern students prefer to talk to the person privately (35%) while western students prefer to tell the class openly (55%).

3.3 Study approach scores of eastern and western students using the SPQ

Eastern and western students' approaches to learning scores and subscales scores were compared. The mean scores of the two student groups on the SM, DM, and AM subscales and on the SS, DS, and AS subscales are listed in Table 7. The deep motive and deep strategy were the most popular learning motive (mean = 24.2) and learning strategy (mean = 23.0) for western students. In contrast, eastern students have a different popular learning motive and strategy. Eastern students' scores were high on surface motive (mean = 25.2), surface strategy (mean = 22.3), achieving motive (mean = 23.5) and achieving strategy (mean = 21.4). With regard to study approaches scores, eastern students' scores were significantly higher than western students for surface approach (46.8 vs. 45.3) and achieving approach (44.9 vs. 38.2). For the Deep Approach the order was reversed (43.7 vs. 47.2).

The higher achieving approach of eastern students may result from the high expectation of parents or family that feel high achievement in education brings honor and prestige to the family. Moreover, the majority of eastern students are full-fee paying international students. Therefore, the eastern students have a high motivation to achieve good results in studying to show their family or a sponsor in their countries. The results support Biggs' argument that Asian students place high value on

education achievement [16]. Shen and Mo [17] also stated that "Academic achievement and upward mobility are not viewed by Asian parents as personal matters but part of their children's obligation for the maintenance of the family." On the other hand, most of the western students have less pressure from parents or family to achieve a high grade. According to the survey results, most of the western students stated that their parents expect them to do their best but do not pressure them or feel that high academic achievement brings prestige to the family. In addition, most western students are Commonwealth Supported Place[1] students. Therefore, western students have less pressure to obtain the highest grades.

The higher surface approach scores of eastern students showed that they seem less interested in the contents of subjects. This may result from their educational background experience of learning by rote in a teacher-centered environment. When eastern students have to study in a new learning environment, they need to adjust themselves for survival. In addition, they may have language problems if English is not their first language. When eastern students have to read and write in English, they require more time and effort to study when compared to western students.

On the other hand, western students' scores on deep approach scores were higher than eastern students' scores. This indicated that western students are more interested in what they are studying rather than competition to get a high grade. Accordingly, Liu [18] claimed that "western people sometimes ridiculed the high prestige and importance in which examinations were held by Asian students" (p. 38).

TABLE 7 Approach scores and subscales scores of Eastern and Western students using the SPQ

Scales / subscales	**Eastern student (n = 131)**	**Western student (n = 54)**	**t-Test**	**Sig. (2-tailed)**
Motives				
Surface	24.5(4.54)	23.9 (5.46)	0.6	.265
Deep	22.6 (3.98)	24.2(3.84)	-2.4***	.000
Achieving	23.5 (4.66)	21.6 (5.29)	-1.9*	.024
Strategies				
Surface	22.3(3.72)	21.4 (4.49)	0.9	.227
Deep	21.1 (4.28)	23.0(3.42)	-1.9*	.024
Achieving	21.4 (4.91)	16.5 (5.47)	4.9***	.000

[1] A Commonwealth supported place refers to a student's enrolment in a program towards which the Australian Government contributes to the cost of education.

Approach				
Surface	46.8 (7.38)	45.3 (8.85)	1.5*	.017
Deep	43.7 (7.36)	47.2(5.77)	-3.5**	.010
Achieving	44.9 (7.94)	38.2 (8.57)	6.7***	.000

**p<.05 **p<.01 ***p<.001*

3.4 Eastern and western students' learning style preferences

Learning style preferences of undergraduate students in Information Technology and Systems have been determined using the ILS. According to Table 8, active, visual and sequential learning styles were more popular among eastern students (51.9%, 82.4% and 55.0%) and western students (58.5%, 77.4% and 50.9%). The results also show that the percentages of eastern students were slightly more reflective, visual and sequential when compared to western students. Chi-square tests were performed to test for differences in learning style preferences between eastern students and western students for each scale. According to the chi-square test results, the proportion of eastern students and western students were not significantly different in learning style preferences for this sample study.

Table 8 Learning Style Preferences

Learning Style Preferences	Eastern		Western	
	Freq.	**Percent (%)**	**Freq.**	**Percent (%)**
Active	68	51.9	31	58.5
Reflective	63	48.1	22	41.5
Visual	108	82.4	41	77.4
Verbal	23	17.6	12	22.6
Sequential	72	55.0	27	50.9
Global	59	45.0	26	49.1

3.5 Factor analysis of SPQ

The responses to the 42 questions of the SPQ were investigated to determine if there was an underlying latent variable structure. The SPSSx software package was used to perform principle axis factor analysis with the Varimax method. The initial factor analysis obtained twelve factors with eigenvalues greater than 1.0. These factors were examined. Using a minimum variable loading of |0.4|, six factors with less than three variables were eliminated. The remaining six factors with 30 variables gave interpretable results. The variable loadings are illustrated in Table 4 and the scenarios within each factor structure are shown in Table 5.

Table 4 Rotated Factor Matrix (rotation converged in 26 iterations)

Question	Factor					
	1	2	3	4	5	6
24. After a lecture or lab I reread my notes to make sure they are legible and that I understand them.	.708					
6. I summarize suggested readings and include these as part of my notes on a topic.	.707					
42. I keep neat, well-organized notes for most subjects.	.654					
36. I make a point of looking at most of the suggested readings that go with the lectures.	.589					
18. I try to do all of my assignments as soon as possible after they are given out.	.579					
35. I spend a lot of my free time finding out more about interesting topics which have been discussed in different classes.	.456					
3. I want top grades in most or all of my courses so that I will be able to select from among the best positions available when I graduate.		.667				
13. Whether I like it or not, I can see that further education is for me a good way to get a well-paid or secure job.		.625				
9. I have a strong desire to excel in all my studies.		.597				
15. I would see myself basically as an ambitious person and want to get to the top, whatever I do.		.564				
37. I am at university mainly because I feel that I will be able to obtain a better job if I have a tertiary qualification.		.538				
23. I try to relate what I have learned in one subject to that in another.			.687			
5. While I am studying, I often think of real life situations in which the material that I am learning would be useful.			.543			
41. I try to relate new material, as I am reading it, to what I already know on that topic.			.534			
17. I find that I have to do enough work on a topic so that I can form my own point of view before I am satisfied.			.527			
16. I tend to choose subjects with a lot of factual content rather than theoretical kinds of subjects.			.449			
11. In reading new material I often find that I'm continually reminded of material I already know and see the latter in a new light.			.443			
Question	**Factor**					
	1	**2**	**3**	**4**	**5**	**6**
39. I believe that society is based on competition and school and universities should reflect this.				.580		
38. My studies have changed my views about such things as politics, my religion, and my philosophy of life.				.462		
32. I believe strongly that my main aim in life is to discover my own philosophy and belief system and to act strictly in accordance with it.				.446		
1. I chose my present courses largely with a view to the job situation when I graduate rather than out of their intrinsic interest to me.				.437		

33. I see getting high grades as a kind of competitive game, and I play it to win.				.434		
34. I find it best to accept the statements and ideas of my lecturers and question them only under special circumstances.				.419		
4. I think browsing around is a waste of time, so I only study seriously what's given out in class or in the course outlines.					.617	
22. I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.					.502	
25. Lecturers shouldn't expect students to spend significant amounts of time studying material everyone knows won't be examined.					.453	
7. I am discouraged by a poor mark on a test and worry about how I will do on the next test.					.398	
26. I usually become increasingly absorbed in my work the more I do.						.659
30. I test myself on important topics until I understand them completely.						.578
29. I find most new topics interesting and often spend extra time trying to obtain more information about them.						.417

Table 5 Factors underlying students' approaches to learning

Factor	Description	Question
1	Organisation of Resources	6, 18, 24, 35, 36, 42
2	Career and job options	3, 9, 13, 15, 37
3	Making links between topics and courses	5, 11, 16, 17, 23, 41
4	Personal goals and ambition	1, 32, 33, 34, 38, 39
5	Alignment with syllabus	4, 7, 22, 25
6	Engagement and effort	26, 29, 30

Factor 1: Resource organisation describes the characteristics of students who scoring high on this factor, would have organized note-taking methods and deliberate and careful planning of their study topics and scheduled study times. This factor measured by the subscale Achieving Strategy.

Factor 2: Career and job options describe a type of student learning that is driven by a desire to obtain academic qualifications for career and job purposes (measured by the subscales Surface Motive and Achieving Motive).

Factor 3: Making links between topics and courses describes the characteristics of students who scoring high on this factor, would relate their previous knowledge to new knowledge, integrate knowledge from different subject areas, relate theoretical ideas to everyday experiences and learn with the intention to understand (measured by the subscale Deep Strategy).

Factor 4: Personal goals and ambition describes the characteristics of students who scoring high on this factor would strive hard to succeed and be interested in getting high marks.

Factor 5: Alignment with syllabus describes the characteristics of students who scoring high on this factor, would stick closely to the syllabus and not be willing to do any extra work that does not lead to a higher mark (measured by the subscales Surface Motive and Surface Strategy).

Factor 6: Personal values and effort describes the characteristics of students who, scoring high on this factor, would practice exam questions to maximize scores, and be committed to learning and seek to understand the content of the course.

An overall score for each student for each factor was calculated by summing the responses to the questions. The differences between eastern and western students overall scores were determine using t-Test. There were significant differences for

factors 1, 4 and 6 for eastern students. These showed that eastern students are more organized, have higher goals and ambitions, and put more effort into learning.

The factor structure yielded in this study differs from that previously reported by Biggs' study. Factors 1, 2 and 3 in this study correspond well with the subscales achieving strategy, achieving motive and deep strategy respectively. Factors 4 to 6 all contain items which are spread over two or three subscales. The factor structures of students in Information Technology are different from those of students in other fields of study. Table 6 shows the salient factor loadings for the present study and for Biggs' university sample.

Table 6 Factor loadings for the present study and for Biggs' university sample

Subscales	Question	Bigg's Varimax Australian University (N = 823)						Present study Varimax (N = 185)					
		1	2	3	4	5	6	1	2	3	4	5	6
Surface	1	665									437		
Motive	7											398	
	13	608				347			625				
	19												
	25		594									453	
	31	392		-476									
	37	687							538				
Surface	4		678									617	
Strategy	10												
	16									449			
	22		557				-329					502	
	28		268										
	34										419		
	40												
Deep	2			578									
Motive	8												
	14			537									
	20			597									
	26			556	324								659
	32										446		
	38	272									462		
Deep	5				420					543			
Strategy	11				683					443			
	17			246	261		283			527			
	23				720					687			

	29		-304				455						417
	35		-377				355	456					
	41				701					534			
Achieving	3					724			667				
Motive	9					649	247		597				
	15					643			564				
	21												
	27												
	33					438					434		
	39										580		
Achieving	6						540	707					
Strategy	12						656						
	18						676						
	24						660	708					
	30				315		506						578
	36						649	589					
	42						572	654					

4 Principles for Designing Personalized E-Learning Systems

The study has shown that eastern and western learners have different study approaches and characteristics which are require different support in learning. Below are principles that need to be considered when designing a personalized e-learning system for students who have different cultural backgrounds.

- **Educational value differences**. From the survey results, eastern students and their families place high values on their educational results. Therefore, eastern students are more serious with their educational results than western students. In order to answer correctly in an examination, eastern students expect a very precise answer from their instructors. Instructors and course designers should be sensitive to this issue in providing online course materials for international students.
- **Educational cultural background differences.** The survey results showed that a common feature of eastern tradition educational backgrounds was rote learning. Therefore, eastern students are less likely to criticize or discuss their opinions in class. When designing a system, instructors and course designers need to provide activities for interaction in the early stages of the online course to encourage participation from the eastern students.
- **Cultural communication differences.** Eastern cultures tend to be high-context [19]. This means that people from eastern cultures are indirect, implicit and reserved in communication. According to the survey results, when eastern students have a difference of opinion with somebody in their class,

most prefer to talk to the person privately or they may simply remain silent, as confrontation is seen negatively in their culture. While western cultures tend to be low- context, which means that they are direct, explicit and unambiguous in communication. Western students prefer to openly discuss disagreements in class. In addition, eastern students were more respectful to their teachers. They prefer to listen and get feedback from their instructors rather than peers [20]. Instructors and course designers should understand this difference as it might cause potential problems with discussion forms in the online learning environment.

- **Different language usages.** Language is closely related to culture. In a globalized e-learning system, students come from a variety of cultural backgrounds therefore, instructors and course designers should be aware of this issue. Using slang or local idioms may cause confusion to the students who do not have the same culture backgrounds. It is recommended to use relatively simple sentences for non-native speaking students.
- **Learning style preferences**. According to the survey results regarding learning style preferences, eastern students and western students were not statistically-significant difference in learning style preferences. However, students have different learning style preferences in each culture group. Instructors and course designers need to provide course material that takes into consideration students' individual learning style preferences.

5. Conclusion

This research has discussed the issues related to the principles for designing a personalized e-learning system that that takes into consideration aspects of cultural influences on student learning approaches and learning styles. The results revealed that students from different culture backgrounds have different learning approaches. In order to design a personalized e-learning system that can help to improve the learning ability of the students from different cultural backgrounds, the issues of educational value differences, educational cultural background differences, cultural communication differences, language usage differences and students' individual learning style preferences need to be considered.

REFERENCES

[1] R. Bennett, "Determinants of undergraduate student drop out rates in a university business studies department," *Journal of Further and Higher Education*, vol. 27, no. 2, pp. 123-141, 2003.

[2] K. Franfola, (2007, February 15). Why online learners drop out, [Online]. Avalable: http://www.workforce.com/featire/00/07/29/.

[3] J. Jun, "Understanding E-dropout," *International Journal on E-Learning*, vol. 4, no. 2, pp. 229-240, 2005.

[4] J. Liu, *Asian students' classroom communication patterns in U.S. universities*. Westport, CT: Ablex Publishing, 2001.
[5] K. Kuwahara, (2005, November 10-11). Understanding Asian ESL students: Translating school cultures, [Online]. Avalable: http://www.catesol.org/ Kuwahara.pdf
[6] S. N. Smith, R. J. Miller, and B. Crassini, "Approaches to Studying of Australian and Overseas Chinese University Students," *Higher Education Research & Development*, vol. 17, no. 3, pp. 261-276, 1998.
[7] P. J. Rutledge, *The Vietnamese Experience in America.* Bloomington: Indiana Univer- sity Press, 1992.
[8] N. Caplan, J. K. Whitmore, and M. H. Choy, "Indochinese Refugee Families and Academic Achievement," *Scientific American*, vol. 266, pp. 6-42, 1992.
[9] M. Leung, J. Li, Z. Fang, X. Lu, M. Lu, "Learning Approaches of Construction Engineering Students: A Comparative Study between Hong Kong and Mainland China," *Journal for Education in the Built Environment,* vol. 1, no. 1, pp. 112-131, 2006.
[10]Y. Liu, "Designing Quality Online Education to Promote Cross-Cultural Understanding," in *Globalized E-Learning Cultural Challenges*, A. Edmundson Ed. London: Information Science Publishing, 2007, pp. 35-59.
[11]R. M. Felder and R. Brent, "Understanding Student Differences," *Journal of Engineering Education*, vol. 94, no. 1, pp. 57-72, 2005.
[12]B. Collis, "Designing for differences: cultural issues in the design of WWW-based course-support sites," *British Journal of Education Technology*, vol. 30, no. 3, pp. 201-215, 1999.
[13]J. Biggs, *Student Approaches to Learning and Studying*. Melbourne: Australian Council for Educational Research, 1987.
[14]J. Biggs, *Study Process Questionnaire Manual*. Hawthorn: Australian Council for Educational Research, 1987.
[15]R. M. Felder and L. K. Silverman, "Learning and teaching styles in engineering education," *Engineering Education*, vol. 78, no. 7, pp. 674-681, Apr. 1988.
[16]J. Biggs, "Approaches to learning in secondary and tertiary students in Hong Kong: some comparative studies," *Educational Research Journal*, vol. 6, pp. 27-39, 1991.
[17]W. Shen and W. Mo, *Reaching out to their cultures-Building communication with Asian American families*, [Online]. Avalable: http://www.ncela.gwu.edu/pathways/ asian/cultures.htm
[18]Y. Liu, "Designing Quality Online Education to Promote Cross-Cultural Understanding," in *Globalized E-Learning Cultural Challenges*, A. Edmundson Ed. London: Information Science Publishing, 2007, pp. 35-59.
[19]K. J. Kim and C. J. Bonk, "Cross-cultural comparisons of online collaboration," *Journal of Computer-Mediated Communications*, vol. 8, no. 1, [Online]. Avalable: http://www.ascusc.org/jcmc/vol8/issue1/ kimandbonk.html
[20]A. Levine, B. Oded, U. Connor and I. Asons, "Variation in EFL-ESL peer response," *Teaching English as a Second or Foreign Language*, TESL-EJ, 2002.