DO WE REALLY LEARN DIFFERENTLY? A CASE OF COMPARING LEARNING STYLES OF TWO CULTURALLY DIFFERENT GROUPS OF STUDENTS

Nauman Saeed[1], Suku Sinnappan[2] and Stefanie Markham[3]
[1]*La Trobe University, Faculty of Business, Economics and Law, Melbourne, Australia*
[2]*Swinburne University of Technology , Faculty of Higher Education, Melbourne, Australia*
[3]*Georgia State University, Department of Computer Science, Atlanta, USA*

ABSTRACT

This article examines the learning styles of two groups of students engaged in a collaborative project but studying at different universities, one in Australia and the other in the USA. However, almost all of the students from the Australian cohort were international students from China thus this study is essentially a comparison between American and Chinese students. A comparison was made between the learning styles of these two groups and how cultural conditioning was reflected in their learning preferences. Felder-Soloman's Index of Learning Styles (ILS) was used to collect learning styles data, which was later analysed using SPSS software. No significant differences were observed in the learning style preferences of the two groups suggesting that culture didn't play a significant part in defining their learning habits. The findings also negate the notion that Asian (Chinese) students are more prone to rote learning, memorization or passivity as compared to their Western counterparts.

KEYWORDS

Learning styles, cross culture study, higher education.

1. INTRODUCTION

Learning styles are important to be understood by the educators to make sure that intended learning outcomes are achieved. This is important especially in multicultural setting where different learning styles can co-exist and standard teaching approaches will not apply well to all students. There have been many studies showing that even well prepared lectures do meet with failure due to mismatch between style of instruction and diverse group of students. Student backgrounds and culture have been thought to play an important role in forming instructions in deciding the learning outcomes and certainly learning experiences. Gathering information on learning styles of all students before teaching and organizing appropriate learning and teaching activities for each student is a mammoth task almost impossible to be achieved despite the well documented benefits. Studies have shown that there are distinct differences between students from different cultures and the learning styles they inherit. A thorough review of the learning styles has been previously done in (Coffield, Moseley, Hall, & Ecclestone, 2004a, 2004b). The association of culture and learning styles has been seen in many literatures. Guarnaccia & Rodriguez (1996) noted that high power distance cultures like the eastern countries have greater difference in the inequality among students and teachers. In these cultures, a teacher is seen as the initiator of all communication and it is a norm that students only speak when asked to. This is in contrast to western norms and culture.

Understanding this difference could help avoid disastrous class experiences. Given the increasing number of international students and the increased uptake in online education, understanding of leaning styles might become more important than before as Australia prepares its education trade for the next decade. This understanding could allow educators to exploit students' strength and help them in their learning journey. This study is therefore aligned along this interest. However, there have been a limited number of studies comparing learning styles of students from various countries. This study has been motivated by this factor and thus is designed to compare the learning styles of two groups of students who were engaged in a collaborative project, one from Swinburne University of Technology in Australia and the other from Georgia

State University in the USA. Moving forward the paper is outlined with sections such as introduction, background, method, results, discussion and conclusion.

2. BACKGROUND

This section lays the background of the study by presenting various definitions of learning styles and their significance in teaching and learning. This is followed by an overview of various learning styles models or instruments that are available to capture students' learning styles preferences. Finally, we discuss the impact of culture on learning style preferences and what role culture plays in driving learning habits.

2.1 Learning Style Theories/Models

Because of the multitude of learning style theories and authors, there is no fix term for learning style. Some authors interchangeably use the terms learning styles and cognitive styles. Others use terms like modality preferences, learning preferences, learning strategies or information processing styles (Wolf, 2007). Several authors have presented their views on learning styles. Dunn & Dunn (1993) defined learning style as "the way in which each learner begins to concentrate on, process, and retain new and difficult information". Keefe defined learning styles as "characteristic cognitive, effective, and psychological behaviours that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (Keefe, 1979). However, we stick to a simpler definition from Sadler-Smith, which considers learning style as "a distinctive and habitual manner of acquiring knowledge, skills or attitudes through study or experience" (Sadler-Smith, 1996).

In an attempt to provide a framework for the growing number of different learning style theories, Curry conceived the 'Onion Model' and suggested that learning styles theories can be generally categorised into three different layers, with each layer representing a particular construct (Curry, 1983). The outmost layer of the onion model represents instructional preferences; the middle layer represents learning styles or information processes style; and the inner layer, the onion's core, consists of cognitive personality elements, inner layer being the most stable among the three.

Based on the above categorisation, different learning style theories/models can be placed in each of these layers. For example, Curry placed the Dunn & Dunn (1993) model in the outermost layer (instructional preferences), which is considered as the least stable layer. Dunn & Dunn model identifies learning style elements in five categories: environmental; sociological; emotional; physiological; and, psychological (Dunn, Griggs, Olsen, Beasley, & Gorman, 1995). Several instruments and adaptations of this model can be found in the learning style literature: Felder and Silverman's index of learning styles (ILS) is one of them. Partially based on the work of Carl Jung (1933) and (Kolb, 1984), the cognitive or information processing perspective of the Felder and Silverman model was developed in 1988 to address the needs of engineering and science education in general. This model was subsequently used by Felder and Soloman in 1991 to develop a questionnaire-based assessment known as Felder-Soloman's Index of Learning Styles (ILS). This ILS measures learning styles on four bi-polar dimensions related to the preference for the type of information perceived (sensory to intuitive); the modality by which that sensory information is most effectively perceived (visual to verbal); the manner in which it is processed (active to reflective); and, the manner in which a learner progresses toward understanding (sequential to global) (Felder & Silverman, 1998). This model is relatively new but very popular, comprehensive and is considered reliable in measuring individual's learning styles (Felder, 2005; Zywno, 2003). It has been used in a number of learning styles studies, especially in engineering, IT and science education thus deemed suitable for this study.

The second layer (information processing style) of the Onion model may contain Kolb's experiential learning theory/model (Kolb, 1984). Kolb categorised learners as convergers, divergers, accommodators and assimilators. Similarly, the Honey and Mumford model (Honey & Mumford, 1982) can also be placed into the second layer. This model categorises learners as active, reflective, theorists and pragmatists.

The third and the innermost layer (cognitive personality style) may contain elements like field dependent - field independent; adaptive - innovative; or the wholist - analytical and verbaliser - imager dimensions of cognitive styles (Sadler-Smith & Riding, 1999). In addition to the above mentioned learning styles, other learning style dimensions can also been found in the literature. For example: Gregorc's Mediation Ability

Model which perceives learning style dimensions as: concrete sequential, abstract sequential, abstract random and concrete random (Gregorc, 1984); McCarthy's 4 MAT System which classifies learners as imaginative, analytical, common sense and dynamic (McCarthy, 1987); and the Canfield Learning Style Inventory (1992) which identifies learning preferences on four dimensions as conditions for learning, area of interest, mode of learning, and performance expectation. However, in this study we will concentrate on Felder's learning style dimensions as it is more suited to classroom application and provide better indication of the preference profile of a group of students (Vita, 2010).

2.2 Culture and Learning Styles

Culture can be defined as both a product of group values, norms, and experiences and of individual innovations and life histories (Guarnaccia & Rodriguez, 1996). But in simple terms culture is the way people think, act and relate to each other. If we look back at the definitions of learning styles mentioned above, it would not be difficult to understand that culture is an integral part of learning process and plays a critical role in reinforcing learning style preferences.

The link between culture and learning styles is well documented in the literature. Pratt (1992) argues that learning styles may vary from culture to culture. While investigating Kolb's model, Hughes-Wiener (1986) hypothesised that cross-cultural differences exist within each stage of the experiential learning cycle. Hsu (1985), Pratt (1991) and Triandis (1989) have demonstrated in their studies that Chinese and Western concept of 'self' provides rationale of cultural impact on learning style. For example, in a collectivist culture like China where people don't put emphasis on individuals would be more inclined towards a more observing and less active learning style as compared to their Western peers who are more individualistic. On the other hand, Zualkernan et al. (2005) conducted a study to compare learning styles of American and Arab students and found strong similarities between the two culturally diverse groups, using Felder-Soloman's LSI. In this paper, we adopt a similar approach by investigating learning styles of two groups of students; one studying at Swinburne University of Technology (SUT) in Australia and the other at Georgia State University (GSU) in the USA. It is important to mention here that almost all students from the Australian group were international students from China. So this study is essentially a comparison between Chinese and American students.

3. METHOD

3.1 Study Participants

As mentioned earlier, the study was conducted simultaneously at SUT and GSU. The SUT participants were undergraduate Information Systems students studying "e-Commerce" subject, which ran for 12 weeks. All members of this group were international students from China except one. On the other hand, the GSU participants were undergraduate Computer Science students studying "Professional Practices and Ethics" subject which also ran for 12 weeks. Both groups took part in a survey that was conducted at the end of the semester. From the Australian group, 27 (out of 45) students took part in the survey while 29 (out of 35) responded from the American group.

3.2 Survey

Learning styles data was collected using Felder-Soloman's Index of Learning Styles (ILS) (Felder & Soloman, 1993). Felder's model classifies students as: active – reflective; sensing – intuitive; visual – verbal; and sequential – global learners (Felder, 1996). According to Felder's model: active learners tend to retain and understand information best by doing something active with it, discussing or applying it, or explaining it to others while reflective learners prefer to think about it quietly first (Felder & Silverman, 1998). Sensing learners tend to like learning facts, whilst intuitive learners often prefer discovering possibilities and relationships. Intuitors tend to work faster and be more innovative than sensors, while sensors tend to be more practical and careful than intuitors (Felder & Soloman, 1993). Visual learners remember best what they see, for example pictures, diagrams, flow charts, time lines, films, and demonstrations while verbal learners

get more out of words (written and spoken explanations) (Felder & Silverman, 1998). Sequential learners tend to gain understanding in linear steps, with each step following logically from the previous one. Global learners tend to learn in large jumps, absorbing material almost randomly without seeing connections, and then suddenly "getting it" (Brown, Zoghi, Williams, Sim, & Holt, 2009).

The Felder-Soloman's ILS consists of 44 questions each carrying two responses ('a' or 'b'). It provides the scores 11A, 9A, 7A, 5A, 3A, 1A, 1B, 3B, 5B, 7B, 9B, 11B for each of the four scales. Scores 1-3 on either side of the scales represent 'mild' or 'well-balanced' preferences, scores 5-7 represent 'moderate' and scores 9-11 represent 'strong' preferences - a total of 12 possible outcomes on each scale. Felder's model is considered as one of the most-used models to capture individual differences during the last decade (Dag & Gecer, 2009). Its free Web-based presence, ease of use, automatic reporting feature and the accompanying descriptive information provided by its authors are some other good reasons for adopting this instrument in this study. A number of previous studies have confirmed the reliability of Felder-Soloman's ILS. For example, Zywno (2003) provided support for the reliability of Felder-Soloman's ILS for its intended purpose of identifying learning styles. Litzinger et al. (2007) conducted a study to assess the reliability, factor structure and construct validity of Felder-Soloman's ILS and reported that the original ILS generated data with acceptable levels (0.55 and 0.77) of internal consistency. The factor analysis and student feedback also provided strong evidence for its construct reliability. Felder's ILS questionnaire is freely available at: http://www.engr.ncsu.edu/learningstyles/ilsweb.html.

4. RESULTS

4.1 Data Analysis

The survey data was analysed using SPSS software. Table 1 shows the mean and standard deviation (SD) values for all learning styles dimensions for both Australian and American students. The figures clearly show that the majority of students on all scales were mild (values between 1 and 3) or well-balanced (in the middle of two dimensions), except visual-verbal scale in which the majority was moderate (values between 5 and 7) with visual dominance. This is consistent with the findings of Zualkernan et al (2005) in which they compared learning styles of American and Arab students but didn't find significant differences in their scores. Table 2 presents the mean scores of the bi-dimensional learning styles scale. These figures are obtained by subtracting the mean of first dimension with that of the second dimension and placing letter 'a' or 'b' for which the mean was larger. For example, in case of Australian students, the difference of active (1.70) and reflective (1.00) means would yield 0.70a. Despite the fact that the majority of students from both groups were well-balanced except visual-verbal scale, a careful comparison between the two groups revealed that Australian students were slightly inclined towards active, sensing and global dimensions while American students were marginally tending towards reflective, intuitive and sequential dimensions.

Table 1. Descriptive Statistics

Dimension	Australian (Chinese) Students		American Students	
	Mean	SD	Mean	SD
Active	1.70	2.37	1.28	2.12
Reflective	1.00	1.57	1.93	2.59
Sensing	1.96	2.70	2.00	2.93
Intuitive	1.33	2.10	2.31	2.77
Visual	5.26	3.90	5.66	3.78
Verbal	0.63	1.31	0.31	0.81
Sequential	1.07	2.16	1.72	1.94
Global	2.15	2.20	1.62	2.68

Table 2. Mean of Learning Styles Scores for Australian (Chinese) and American Students

	Australian (Chinese) Students	American Students
Learning Styles Scale	Mean	Mean
Active –Reflective	0.70a	0.65b
Sensing – Intuitive	0.63a	0.31b
Visual – Verbal	4.63a	5.53a
Sequential – Global	1.08b	0.10a

4.2 Independent-Samples t-test

To confirm whether there are significant differences present between the learning styles scores of the two groups, Independent-Samples t-test was performed using SPSS software. The results of the t-test are presented in Table 3.

Starting with 'Active' learning style, no statistical significant difference was found in the scores of Australian (Mean = 1.70, SD = 2.37) and American students (M = 1.28, SD = 2.12; t (54) = 0.714, p = 0.479). Statistical difference is considered significant when Sig. (2-tailed) value is either equal or less than 0.05 (e.g., p = 0.03, 0.1, 0.001) (Pallant, 2005). As evident from Table 3 (last column), none of the learning styles dimensions exhibited statistical significant differences in the scores of two groups.

Table 3. Independent-Samples t-test

Learning Style Dimension	Levene's Test for Equality		t-test for Equality of Means		
	F	Sig.	T	df	Sig. (2-tailed)
Active					
Equal variances assumed	.521	.474	.714	54	.479
Equal variances not assumed			.711	52.27	.480
Reflective					
Equal variances assumed	7.79	.007	-1.61	54	.113
Equal variances not assumed			-1.64	46.62	.108
Sensing					
Equal variances assumed	.666	.418	-.049	54	.961
Equal variances not assumed			-.049	53.99	.961
Intuitive					
Equal variances assumed	5.71	.020	-1.49	54	.142
Equal variances not assumed			-1.51	51.55	.138
Visual					
Equal variances assumed	.013	.909	-.39	54	.701
Equal variances not assumed			-.39	53.46	.701
Verbal					
Equal variances assumed	4.23	.045	1.11	54	.242
Equal variances not assumed			1.09	42.75	.244
Sequential					
Equal variances assumed	.780	.381	-1.18	54	.242
Equal variances not assumed			-1.18	52.31	.244
Global					
Equal variances assumed	.025	0.875	.802	54	.426
Equal variances not assumed			.808	53.18	.423

5. DISCUSSION

Though the results from Table 1 and 2 showed that there were no significant differences in the learning styles of the two groups of students, a closer examination was required. In that it was revealed that the Australian students were marginally inclined towards active, sensing and global in comparison to their American counterparts. Though they were marginal some of the explanation could be derived from the culture differences between these groups. It was noticed that the Australian students who were from China had strong inclination to discuss their work and shared notes over activities that were required to do in class. This echoed Felder and Silverman's (1998) earlier work which mentioned that active learners tend to like group work more than reflective workers who worked individually. Though American students did discuss the activities the instructors think that their final submission had more individual flavour in comparison to the Chinese students which had more similarities than otherwise. Similar trend is also evident in Hofstede's work on cultural dimensions which confirms that American people are highly individualistic than Chinese whom often act in the interest of the community and not necessarily of themselves (http://geert-hofstede.com/united-states.html).

Culture and background also impacted the other learning styles scales such as sensing vs. intuitive. The reluctance to explore, or question the educator on the specified learning material made Chinese students sensing; to be cautious and rarely explore outside the perimeters of the unit whilst American students were found to be more exploratory and thus intuitive. Again, aspects of cultural differences were reflected in the sequential vs. global learning styles scale. It was noticed that Chinese students were more receptive of any content that were given to them compared to American students who questioned the relationship between the content and teaching and learning activities. Chinese students were happy to absorb the concepts and content to be later 'understood'. They displayed more global learning style, while the American students preferred logical connection making them to be more sequential.

The aforementioned differences, though tested, were found to be not significant. This could be because not all students participated in the study and there were no in-depth qualitative survey carried out on both groups to further probe on to these issues. On the other hand, the findings also suggest that known differences between Chinese students who inherit eastern culture and the western cultured American students is not narrowed to almost insignificant. This could be due to technology evolution that China is facing right now. Due to the population China has the most number of internet users in the world right now. The opportunity to be exposed to other cultures may have changed the approach students adopt towards learning. There is also a slim possibility that Chinese students may have changed their learning styles after studying in Australia. The above discussions lead us to possible avenues of future research which the authors are keen to explore in future.

6. CONCLUSION

The study provides a useful insight into the learning styles of different groups of student in a higher education context. The empirical evaluation highlights marginal differences between the Chinese students studying in Australia and the American students. These differences could have been caused by their cultural and background inheritance. However, further tests revealed that there were no significant differences proposing a notion that technology and societal changes in China could have narrowed the previously known differences once identified by Hofstede (1996).

The study also re-iterates the need to conduct more research on learning styles in the wake of increasing international students and the strong uptake of online education in Australia. Though the paper had limitations given the small student sample the findings were valuable given the limited number of studies within this domain.

In this light, the paper provides useful contribution towards learning styles in higher education. In future, we aim to conduct similar studies in other courses and among cross institutions / cultures in order to get a better understanding of the learning styles phenomenon in higher education settings.

ACKNOWLEDGEMENT

REFERENCES

Brown, T., Zoghi, M., Williams, B., Sim, J., & Holt, T. (2009). Are learning style preferences of health science students predictive of their attitudes towards e-learning. *Australasian Journal of Educational Technology and Society, 25*(4), 524-543.

Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004a). *Learning Styles and Pedagogy in Post-16 Learning: A Systematic and Critical Review, .* London: Learning and Skills Research Centre.

Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004b). *Should We Be Using Learning Styles? What Research Has to Say to Practice*. London.: Learning and Skills Research Centre.

Curry, L. (1983). *Learning Styles in Continuing Medical Education*. Ottawa: Canadian Medical Association.

Dag, F., & Gecer, A. (2009). *Relations between online learning and learning styles.* Paper presented at the World Conference on Educational Sciences, Nicosia, North Cyprus.

Dunn, R., & Dunn, K. (1993). *Teaching secondary students through their individual learning styles: Practical approaches for grades 7-12*. Boston: Allyn and Bacon.

Dunn, R., Griggs, S., Olsen, J., Beasley, M., & Gorman, B. (1995). A meta-analysis validation of the Dunn and Dunn model of learning style preferences. *Journal of Educational Research, 88*, 353-362.

Felder, R. M. (1996). Matters of style. *ASEE Prism, 6*(4), 18-23.

Felder, R. M. (2005). What is known about the reliability and validity of the ILS? Retrieved 10 October, 2012, from http://www.ncsu.edu/felder-public/ILSdir/ILS-faq.htm#validation

Felder, R. M., & Silverman, L. (1998). Learning and teaching styles in engineering education. *Journal of Engineering Education, 78*(7), 674-681.

Felder, R. M., & Soloman, B. (1993). Learning styles and strategies Retrieved 10 October, 2012, from http://www4.ncsu.edu/unity/lockers/users/f/felder/public/ILSdir/styles.htm

Gregorc, A. F. (1984). *Gregorc style delineator: Development, technical and administration manual*. Maynard, MA: Gabrial Systems, Inc.

Guarnaccia, P. J., & Rodriguez, O. (1996). Concepts of culture and their role in the development of culturally-competent mental health services. . *Hispanic Journal of Behavioral Sciences, 18*(4), 419-443.

Honey, P., & Mumford, A. (1982). *The Manual of Learning Styles*. London: Peter Honey.

Hsu, F. (1985). *The Self in cross-cultural perspective*. New York: Tavistock Publications.

Hughes-Wiener, G. (1986). The 'learn how to learn' approach to cross-cultural orientation. *International Journal of Intercultural Relations, 10*(4), 485-505.

Keefe, J. W. (1979). *Student learning styles: Diagnosing and prescribing programs*. Reston, VA: National Association of Secondary School Principals.

Kolb, D. A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. New Jersey, USA: Prentice-Hall, Inc.

Litzinger, T., Lee, S., Wise, J., & Felder, R. M. (2007). A pschometric study of the index of learning styles. *Engineering Education, 96*(4), 309-319.

McCarthy, B. (1987). *The 4MAT System: Teaching to LEarning Styles*. Barrington, IL: EXCEL, Inc.

Pallant, J. (2005). *SPSS Survival Manual* (2nd ed.). Sydney, Australia: Allen & Unwin.

Pratt, D. (1991). Conception of self within China and the United States. *International Journal of Intercultural Relations, 15*(3), 285-310.

Pratt, D. (1992). Conceptions of teaching. *Adult Education Quarterly, 42*(4), 203-220.

Sadler-Smith, E. (1996). Learning styles and instructional design. *Innovations in Education and Training International, 33*(4), 185-193.

Sadler-Smith, E., & Riding, R. (1999). Cognitive style and instructional preferences. *Instructional Science, 27*(5), 355-371.

Triandis, H. (1989). The self and social behaviour in differing cultural contexts. *Psychological Review, 96*(3), 506-520.

Vita, G. D. (2010). Learning styles, culture and inclusive instruction in the multicultural classroom: A business and management perspective. *Innovations in Education and Training International, 38*(2), 165-174.

Wolf, C. (2007). *Construction of an adaptive e-learning environment to address learning styles and an investigation of the effects of media choice.* RMIT University, Melbourne.

Zualkernan, I., Allert, J., & Qadah, G. (2005, 26-28 September). *A cross-cultural comparison of learning styles: The AUS-UMD experience* Paper presented at the The Second International Conference on Innovations in Information Technology, Dubai, UAE.

Zywno, M. S. (2003). *A contribution to validation of score meaning for Felder-Soloman's Index of Learning Styles.* Paper presented at the American Society for Engineering Education Annual Conference and Exposition, Nashville, Tennessee.