LEARNING STYLE VARIATION OF DIGITAL NATIVES

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Abstract

Everyone learns, but not all learn in the same way. Understanding of an individual's natural or habitual pattern of processing information, acquiring knowledge and solving problems is considered to be beneficial in developing pedagogical process and enhancing effective learning. This study reviews the impacts of gender, cultural differences, and variations in disciplines to learning styles. With the aim to investigating the learning style variability, 955 students from the "digital native" generation studying at various institutions of higher learning in Malaysia, China, and Indonesia responded to the Felder-Silverman Index of Learning Styles (ILS) and a demographics questionnaire. It is found that gender does not affect the learning style of the students. All students of three nationalities appear to be visual learners. However, Malaysian and Chinese students prefer sensing and sequential learning while the Indonesian students prefer otherwise. Both engineering and business students appear to be similar type of learners except that engineering students are more sequential than the business students. Cultural and disciplinary variation do affect the way students in the digital era prefer to learn.

Keywords

Learning Style, Digital Natives, Cultural Variation, Disciplinary Variation, Gender Variation

1. Introduction

Everyone learns, but not all learn in the same way and learning styles are simply different strategies or ways of learning. Technically, learning style is the preferred way of an individual absorbs, processes, comprehends and retains information.

Several models have been developed to explain learning styles from different perspectives. It is generally accepted that knowing an individual's learning style can lead to enhanced learning and help the learner focus on improving weaker points. The analysis of an individual's learning style is also useful for informing the teaching and learning process and hence, can be used as a tool to enhance the teaching and learning process.

However, some also believe how students learn is influenced by culture. Guild (1994) advocates cultures affects students' learning styles, and diverse teaching strategies are required to be adopted within groups of great variation among students. The results of a study conducted by Gündüz and Özcan (2010) concluded cultures of the students affect their learning styles. Similar views were also shared by Loh and Teo (2017) that culture influences students' learning, especially in several areas, such as masculinity, collectivism, and power distance. The significance of cultural influences on students learning styles cannot be underestimated due to the changing cultural mix in classroom and society. There is a need to understand the relationship between cultures.

Other than the cultural differences, there are substantial interests in understanding differences in learning styles by disciplines. For example, Ventura and Moscoloni (2015) suggested students tend to adapt in the course of their studies to the academic discipline's specific needs and Khan (2009) showed that students of different professional courses have different learning styles. Contrarily, Almeida (2012) did not confirm the correlations between disciplines and learning styles and concluded that generally, students from different disciplines (languages, multimedia, biology, biochemistry and biotechnology) do not seem to have different learning styles.

Furthermore, as students become more technologically advanced with unlimited information, entertainment, and social interactions at fingertips which may affect the learning styles of students, technology-enhanced learning has put great attention on learning styles in order to improve adaptively in technology-enhanced educational systems (Graf, Viola, Leo and Kinshuk, 2007).

This study concentrates on an empirical comparative analysis of gender, cultural and disciplinary variations in learning styles among students of three countries: Malaysia, China and Indonesia.

1.1 Theoretical Framework

A popular theory, Kolb's Learning Style Model assesses how individuals receive and interpret information, how they learn through experience (Kolb, 1984). It differentiates concrete experience (CE), abstract conceptualization (AC), reflective observation (RO) and active experimentation (AE) learning abilities. The correlation is summarized in the following figure.
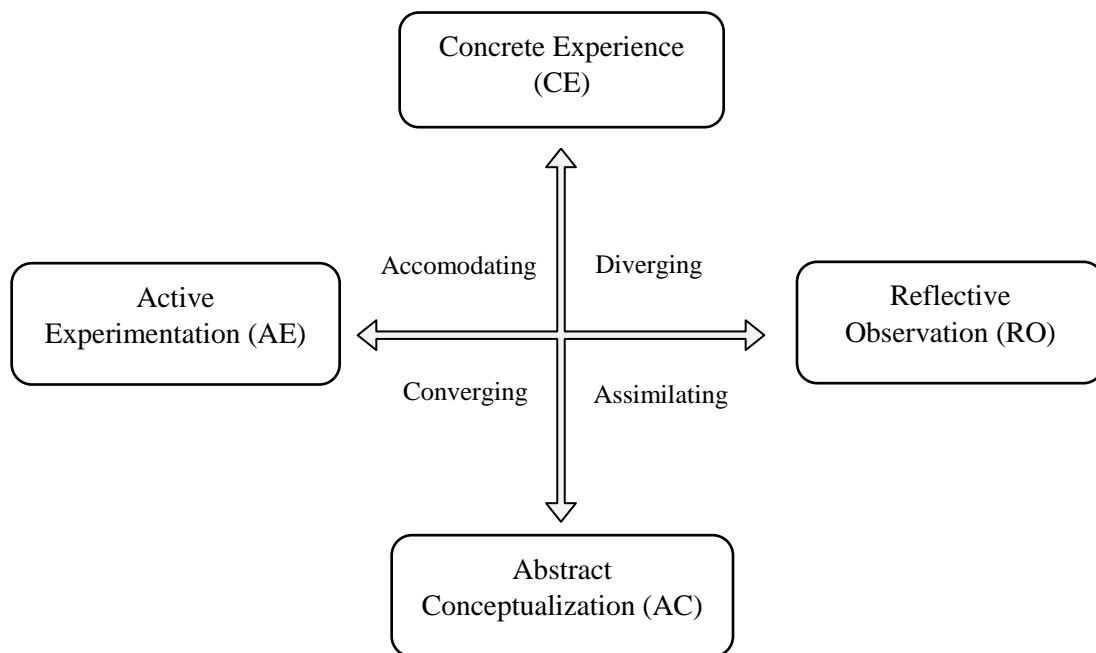

Figure 1: *Experiential learning cycle (Kolb, 1984)*

While Kolb's model focuses on learning abilities, Felder and Silverman (1988) described the learning style of a student based on tendencies and suggest students may have a high preference for certain behavior; however, they may act differently sometimes. The Felder-Silverman Model (1988) classifies students according to the ways they receive and process information and denotes how personality contributes to learning with four learning style dimensions; namely, sensing/intuitive, visual/verbal, active/reflective, and sequential/global. These dimensions can be viewed as a continuum with one learning preference on the far left and the other on the far right. Nevertheless, a combination of these styles makes up the individuals learning preferences.

The four dimensions of the learning style by Felder-Silverman Model (1988) is presented in the following table:

Table 1: *Learning style dimensions as described in the Felder-Silverman Model (1988)*

Sensing style prefers	*Intuitive style prefers*
- physical sensation - Practical and observing - Facts and data - Repetition	- Insight - Imagination and interpretation - Theory and modelling - Variation
Visual style prefers	*Verbal style prefers*
"Show me how" - Pictures and diagrams	"Tell me how" - Written and spoken explanations
Active style prefers	*Reflective style prefers*
"try it out" - Process information by physical activity - Learn by working with others	'think it through' - Process information introspectively - Learn by working alone or in pairs
Sequential style prefers	*Global style prefers*
- Understanding in continuum with incremental steps - Linear reasoning process - Convergent thinking and analysis	- Understanding with leaps - Tacit reasoning process - System thinking and synthesis
Remarks: The corresponding styles are complementary to each other	

2. Research Methods

2.1 Research Instrument

The Index of Learning Styles (ILS), a questionnaire of 44 questions designed to assess the preferences of students on four dimensions developed based on the Felder-Silverman Model (1988) by Felder and Soloman of North Carolina State University is adopted.

The choice of the questionnaire technique is due to the convenience of administration procedures and the ease in answering the questions. In addition, with simple language and short questions of the Felder-Silverman ILS, it is believed samples of diverse cultural backgrounds

will be more responsive. For easy reference and comparison, the various styles are expressed in numerical values for analytical purpose.

There are two main parts in the survey instrument. First part consists of questions about demography of respondents while second part are 44 discrete-choice questions that represent the four dimensions of learning styles classified in the Felder-Silverman model. Each dimension has a score coded on a scale from +11 to -11 and 44 discrete-choice questions. Preferred learning style by students is indicated from the difference between two scores for each question. A case of positive score on the sensing-intuitive dimension indicates that sensing learning style is preferred, while a negative score indicates intuitive learning style is preferred.

2.2 Participants

The respondents involved in this study are 955 students of various institutions in Malaysia (639 students), China (209 students) and Indonesia (107 students), age is ranging from 14 to 39 (mean =19.74; standard deviation =2.88).

3. Results

3.1 Learning Style by Gender

Figure 2 shows the percentage of the four learning style dimensions for male and female students.
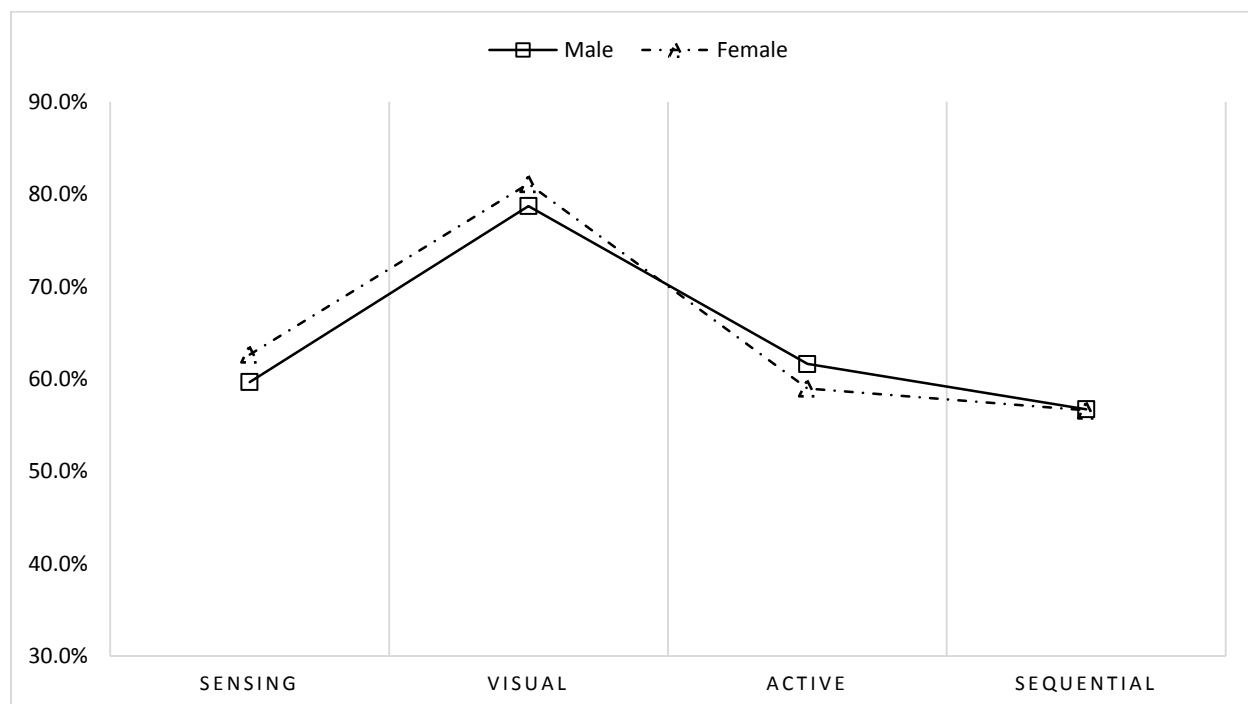
Figure 2: *Learning style by gender*

There is no apparent difference between the male and female students. This observation is similar to the observation of Gündüz and Özcan (2010) though Ozbas (2008) and Tapsir et al. (2010) found that female students are stronger visual learner.

3.2 Learning Style by Nationality

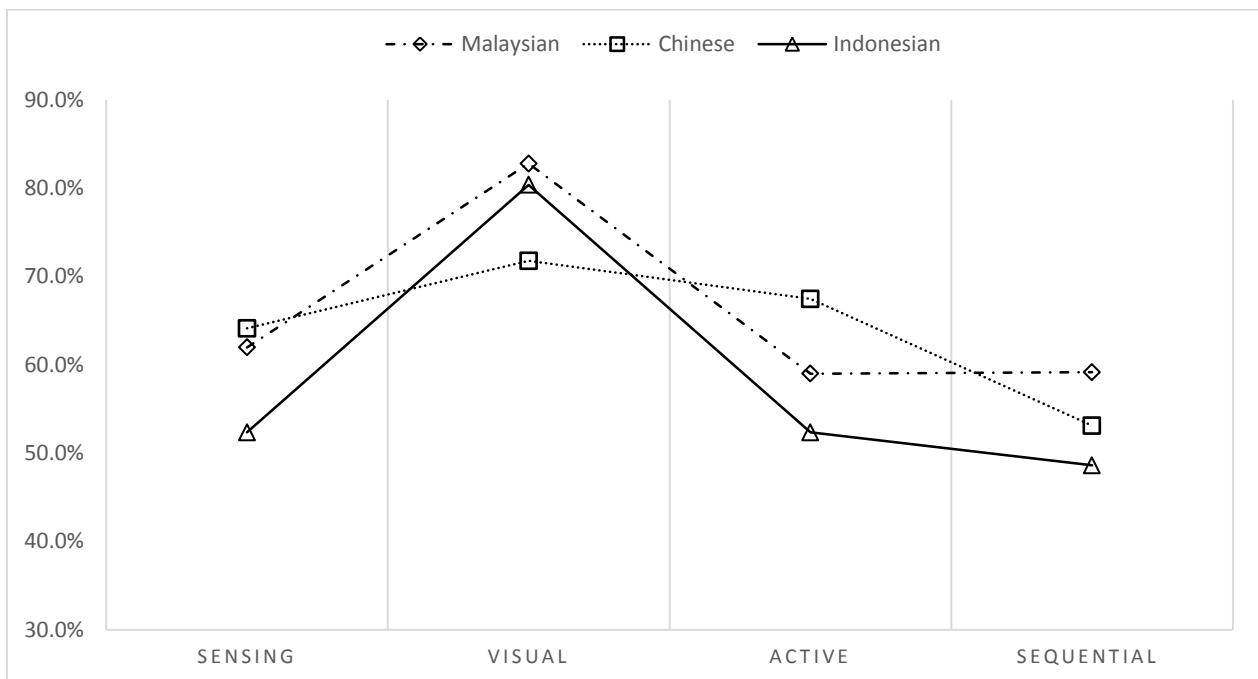Figure 3 shows the differences in learning style by three nationalities, i.e. Malaysian, Chinese and Indonesian.

Figure 3: *Learning style by nationality*

There are a few observations worth further investigation. Firstly, more than 70% of the three nationalities are visual learners. This may be a new common learning style of the digital natives who have benefited from the advancement in the interconnectivity via internet.

Secondly, majority of the both Malaysian and Chinese students appear to prefer learning by sensing and sequential compared to the Indonesian students. Both nations have a rather examination oriented K-12 education environment that promotes repetitive rote learning. However, Indonesian students have a more balanced breakdown of learning style in this dimension.

Thirdly, Chinese students, despite of being labelled as non-participative rote learners by Cortazzi and Jin (2001), it is observed that they have the most active learners in the active/reflective dimension. It is interesting to investigate further if the change of economic landscape and exposure to international arena in China are the reasons behind the switch of their learning style.

Lastly, Indonesian students are the comparatively more intuitive, reflective and global learners. This observation does not exhibit the same trend of the survey outcomes conducted by Rahadian and Budiningsih (2017) on middle school students which shows Indonesian students are generally sensing, active and sequential learners. Further studies in this is required to validate the findings.

3.2 Learning Style by Discipline

Figure 4 shows differences in learning style by engineering and business disciplines.
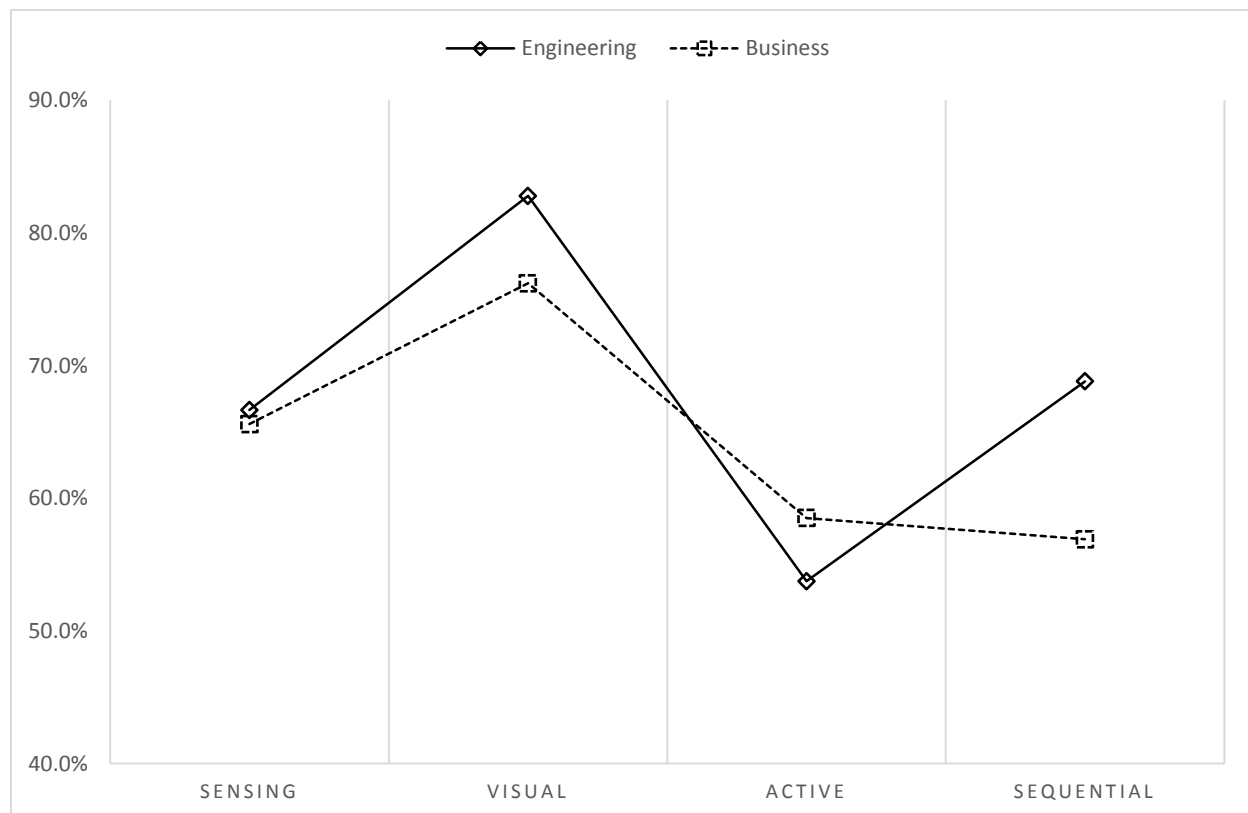

Figure 4: *Learning style by discipline*

It is observed that both engineering and business students do not exhibit apparent difference in the learning dimensions of sensing/intuitive, visual/verbal, active/reflective.

Traditionally, engineering and business students are perceived to be two extreme type of characteristic, i.e. engineering being square and business being out of the box. It is still unclear if the digitalization advancement has changed the way both disciplines learn. However, the engineering students still show their preference in sequential learning than the business students by almost 12%. This is very much anticipated as engineering students, given the nature of its discipline, are trained to solve problems in linear logical sense.

The percentage of visual learners in engineering studies are much larger than the finding of 51% visual learners by Koh and Chua (2012) on their survey conducted at local institutions in Malaysia. Similar observation is found in business studies too. Again, the influence of digitalization may have contributed to the switch of the preferred learning style of the digital natives. However, this does not seem to have changed the learning style of engineering students in the active/reflective dimension as the finding is similar to that of Husain, Mustaza, Mansor and Nurmahirah (2013) where the engineering students learning style is balanced in the dimension.

It is also observed that the business students prefer to learn by sensing (66%), visual (76%), active (58%) and sequential (57%) in each dimension. However, these percentages are much lower than the finding by Ab Ghani, Nik Jaafar and Nik Fauzi (2015) on polytechnic students by minimum 15% in each dimension. One of the possible reasons may be attributed by the age range of respondents in this survey. In Malaysia, polytechnic students must have minimum age of 17 upon completion of primary and secondary studies whereas the respondents to this survey range from 14 to 39 years old. The correlation of the age range remains unclear.

4. Conclusions

The objective of this study is to discern differences in learning style among different gender, culture, as well as those interested in different discipline. While there is no conclusive reasoning behind the preferred learning style, it is observed that there is no apparent difference in gender. All three nationalities show the same preference to learn by visual. Both Malaysian and Chinese students prefer sensing and sequential learning while the Indonesian students show otherwise. The cultural difference in all three countries does play a role in how students in the digital age prefer to learn. Lastly, the learning style in engineering and business studies are marginally different in all dimensions except for sequential/global learning. The influence of

digitalization advancement in how these two disciplines are learning are still pending further investigation.

5. Recommendations for future research

Institutions of higher education should take cultural differences in learning styles into consideration especially student mobility in pursuing higher education is becoming more common. Further studies on influence of advancement in digital technologies on various disciplines should be conducted to investigate if the gap of traditional way of learning can be narrowed or differentiated further.

6. Acknowledgements

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