Discovering the Learning Styles of Malaysian University Students

HAFIZAH HUSAIN[1,2], SERI MASTURA MUSTAZA[2], FAIS MANSOR[2] & WAN NURMAHIRAH[2]

[1]Centre for Engineering Education Research
[2]Department of Electrical, Electronic & System Engineering
Faculty of Engineering and Built Environment,
Universiti Kebangsaan Malaysia
43600 UKM Bangi, Selangor
MALAYSIA
hafizah.ukm@gmail.com

Abstract: - University students' achievement is often associated with their learning style. Many studies support that learning styles can give a strong impact to the program of study undertaken by the students. For example, using a model-based Jung's theory of Psychological Type (JTPT), students from the thinker or sensing element will be more successful in engineering programs because this group will make decisions based on logic and rules. The objective of this paper is to examine the learning styles of engineering students at Universiti Kebangsaan Malaysia (UKM) and how it shaped their academic achievement. Data were collected from questionnaires for the index of learning style that have been developed by Felder-Solomon. The number of respondents is 31 first year students from the Department of Electrical, Electronics and Systems (EES), Faculty of Engineering and Built Environment (FEBE), Universiti Kebangsaan Malaysia (UKM). The result of the analysis shows that the students are strongly visual learners. In the other three categories, these students are well-balanced between the two-elements. As this a longitudal study, nevertheless, this finding is hoped to enable educators to design and develop more effective teaching strategies to facilitate a more conducive learning environment.

Key-Wwords -: Learning style, students' performance, learning style index

1 Introduction

In the 1970's and 1980's some extensive studies has been accomplished on learning styles of students in institutions of higher learning by several research groups, such as, Entwhistle [1] in Great Britain and Biggs [2] in Australia. This study has received considerable attention from researchers in areas other than education, who believe that if students' learning styles can be identified, it will help significantly by providing guidance to lecturers in designing teaching and learning strategies that can effectively be used. This is the same approach used by Felder & Silverman [3].

The main challenge that has been identified is to assume a direct relationship between learning styles, teaching styles and student performance. However, the question that arises is whether learning styles has a direct effect on students' achievement in the programs they have enrolled and whether learning styles are developed according to the culture of the people from different countries.

Many studies indicate that students from Asia often perform better than the others. Marton [4] also stated, for example, that Chinese students prefer to memorizing and understanding because they believe it requires less effort, especially when they are preparing for the important examination. In other words, if the students expect that the questions asked only requires them to reproduce what they have learned, they will tend to turn to rote learning [5]. Similarly, most of the students in Malaysia are more concerned with their scores obtained in the examinations and are more focused on the process of memorizing facts without in-depth thinking to acquire knowledge [6].

In this longitudinal study, the first stage is to identify the learning styles of engineering students in UKM. This paper analyses the results of learning style index developed by [3] taken by the students to confirm the hypotheses.

2 Learning Styles

Students receive and process the information presented to them in different ways due to the different learning styles. Understanding the learning styles is important especially in designing curriculum that could meet the needs of students with diverse learning styles [7]. Due to this,

teaching strategies should also vary. There should be lectures, demonstrations of process and laboratory activities that lead students to self-discovery and cooperative learning techniques to instil team work and communication skills. There are many learning style models that have been developed based on individual interests and tastes. One particular model that has been developed is Jung's theory of Psychological Type (JTPT) which was based on Myers-Briggs Type Indicator (MBTI). JTPT categorize each style in the four-level scale according to the students' interest and the model is ideal for engineering education [7]. The scaled-based categories are as follows;

- Active and Reflective
- Sensing and intuitive
- Visual and verbal
- Sequential and global

Table 1 illustrates clear and distinct differences between the learning styles in each category as stated by [7].

Table 1. Different attributes between the learning styles in 4 categories

Category.	Element 1	Element 2
1	Active Learners • Able to retain and understand information by discussing, applying or explaining it to others	Reflective Learners • When receiving information, they prefer to think about it quietly
2	Sensing Learners • Like learning facts and solving problems by well-established methods but dislike complications. • Patient with details and good at memorizing facts and doing hands-on (laboratory) work. • More practical and careful and prefer courses that have connection to the real world.	Intuitive Learners • Prefer discovering possibilities and like innovation but dislike repetition. • Resent being tested on material that has not been explicitly covered in class. • Better at grasping new concepts and are comfortable with abstractions and mathematical formulations. • Able to work faster and more innovative. • Dislike courses that involve a lot of memorization and routine calculations.
3	Visual Learners • Able to learn better with the help of pictures, diagrams, flow charts, time lines, films, and demonstrations..	Verbal Learners • Able to learn more from words, either written or spoken explanations •
4	Sequential Learner • Can learn better with understanding gained in linear logical steps. • Able to solve problems by following stepwise path.	Global Learners • Able to learn in large jumps, that is absorbing material in random order without seeing connections. • Able to solve complex problems quickly or put things together in novel ways once they have grasped the big picture, but they may have difficulty explaining how they did it.

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Felder & Spurlin [7] stated that engineering education is inclining towards learning approaches to meet the requirements for the following categories of learning styles:

- Reflective learners through lectures and individual assignments and not to the involvement students actively and cooperative learning.
- Intuitive learners place more emphasis on basic science and mathematics and not to the engineering and operational applications.

Visual learners will insist on a more objective analysis of interpersonal decision-making while sequential learners follow the syllabus and try to meet deadlines rather than exploring ideas and solving problems creatively.

2.1 Index of Learning Style

This on-line questionnaire in Felder-Solomon Index of Learning Style [7] consists of forty four 2-choice questions and extensively used in engineering and related areas. The result will automatically be displayed once it is submitted. There are 4 predispositions on the scale of 1 to 11 which are outlined by the outcome of the test as shown in the example in Figure 1. Here, the interpretation of the inclination of the learning styles is better defined and precise as compared to MBTI.

For each category, the result will indicate the inclination between active versus reflective, sensing versus intuitive, visual versus verbal and finally sequential versus global. For scores from 1 to 3, it indicates a balance in their styles. Whereas, for scores between 5 to 7 and 9 to 11, it indicate students with moderate and strong preferences, respectively.

For example, the index of learning style as shown in Figure 1, demonstrate that this student have a strong preference to active learning style and a balance in the other categories.

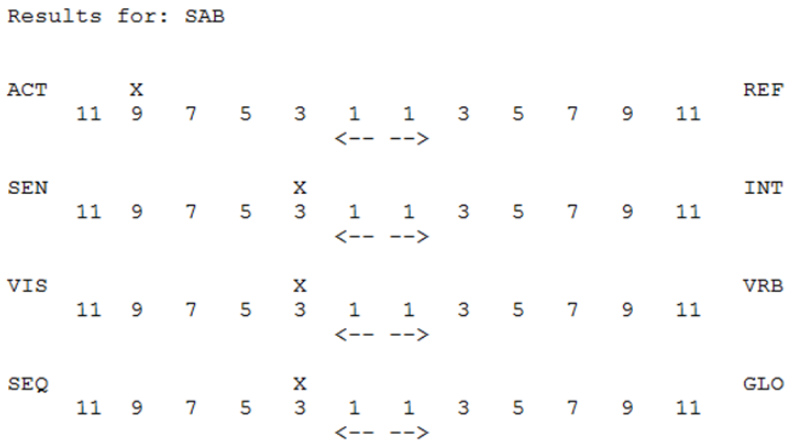

Fig. 1 Analysis of the Learning Style Index for each student

3 Result and Discussions

Table 2 demonstrates the observation performed on the result of the leaning style index for thirty one students from UKM. It is apparent that the majority of the UKM students are balanced in the active (35.5%) and reflective (32.3%) elements as well as balanced (32.3%) between the two scales/elements. The students are also found to be either more intuitive and balance between the two elements. In the third category, they are found to be strongly visual learners with 75% preference. Finally, in the fourth category, the students are balanced on the scale between sequential and global learners.

Table 3 and Table 4 illustrate the result of the descriptive and inferential part of Anova test performed on the students. These statistical analyses are used to confirm the findings based on the observation as shown in Table 2.

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Table 2. Observation on Learning Style on UKM students

Category	Level	STUDENTS (%)
ACTIVE	Mild (3-5)	32.3
	Moderate(7)	
	Strong (9-11)	3.2
REFLECTIVE	Mild (3-5)	32.3
	Moderate(7)	
	Strong (9-11)	
BALANCE ACT_REF		32.3
SENSING	Mild (3-5)	16.1
	Moderate(7)	3.2
	Strong (9-11)	3.2
INTUITIVE	Mild (3-5)	22.6
	Moderate(7)	16.1
	Strong (9-11)	3.2
BALANCE SEN_INT		35.5
VISUAL	Mild (3-5)	12.9
	Moderate(7)	32.3
	Strong (9-11)	35.5
VERBAL	Mild (3-5)	3.2
	Moderate(7)	
	Strong (9-11)	
BALANCE VIS_VRB		16.1
SEQUENTIAL	Mild (3-5)	22.6
	Moderate(7)	6.5
	Strong (9-11)	
GLOBAL	Mild (3-5)	12.9
	Moderate(7)	6.5
	Strong (9-11)	3.2
BALANCE SEQ_GLO		48.4

Table 3 Anova test: Descriptive

Category	*N*	*Sum*	*Average*	*Variance*
ACT	31	60	1.94	5.60
REF	31	31	1.00	2.53
SEN	31	44	1.42	5.32
INT	31	69	2.23	7.98
VIS	31	200	6.45	13.92
VRB	31	5	0.16	0.34
SEQ	31	45	1.45	3.72
GLO	31	46	1.48	6.19

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Table 4 Anova Test: Inferential

Source of Variation	*df*	*MS*	*F*	*P-value*	*F crit*
Groups	30	3.93	0.66	0.91	1.51
Categories	7	111.40	18.71	0.00	2.05
Error	210	5.95			
Total	247				

From the descriptive part of the test, it was found that in the first category for active versus reflective, there is no significant difference for the students. Similarly for the other two categories, sensing versus intuitive and sequential versus global, the students show no significant differences and so is in the category for visual versus verbal, they show a strong preference for visual learning.

On the other hand, from the inferential part of the test, the analysis shows, the value of *F* is less than *F-critical* and the value of *P* is higher than 0.05. This indicates that the trend for each individual student's inclination towards all the learning style is not statistically different. But, however, in learning categories, the value of *F* is higher than *F-critical* and the value of *P* is less than 0.05 and this strongly indicates that there is statistical difference between the categories. It confirms that the students are inclined to visual learning styles. But for the other two categories, they are not statically different.

4 Conclusion

In this study, the learning styles for engineering students in UKM are analysed. They were found to be significantly visual learners. In the other three categories, they are found to be balanced in both elements. This finding would be able to assist the lecturers in UKM in considering the appropriate teaching strategies to facilitate a more conducive environment for learning. Further analysis would need to be made to ascertain whether these learning styles alleviate the students' academic performance, particularly in engineering courses so that some means of filter methods could be established in selection of students.

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