



## An Index of Learning Styles among Universiti Teknologi MARA Students

Salimah Ahmad  
Zakiyah Omar  
Nurhidayah Masni Abdullah

### ABSTRACT

*This study aims at finding an index of learning style among students in Universiti Teknologi MARA (UiTM) Pahang so that the lecturers can adapt the teaching style that match the student's preference. An index of learning style questionnaires (ILS) developed by Felder and Solomon was distributed among students from the science and technology, and social sciences faculties in the university. The respondents' feedback was analyzed based on the four domains of learning styles which are active-reflective, sensing-intuitive, visual-verbal and sequential-global. The findings reveal that students, regardless of their nature of studies, were visual, sensory, active and sequential learners. Such findings can become an important tool to better address the student's needs in the learning process.*

**Keywords:** *learning styles, active, sensing, visual, sequential*

### Introduction

The teaching and learning of mathematics is a matter of concern at Universiti Teknologi MARA (UiTM) Pahang. Because of the high failure rates in certain mathematics courses, lecturers are finding ways and means to effectively help students to better understand and learn mathematics. Traditional mathematics teaching involves a brief explanation followed by few examples illustrated on the white board. Lecturers give exercise to students to work on, at the same time they move around the classroom watching how the students were doing. The materials given were the same but some students understand better than the others. Since not all students can benefit from the same approach, it is vital for lecturers to use variety of methods to reach the students.

Many universities have identified students' learning styles and use this information as a tool to better address the students' needs. By identifying students' learning styles, lecturers would have better understanding about their students and can come up with a delivery method that closely aligns with their ability to learn (Mc Cabe, 2003). Learning styles are the key for successful group formation. Grouping the students according to their learning styles particularly the active vs reflective and sensing vs intuitive, improve collaborative learning (Alfonseca et al., 2006). Students score significantly higher when learning style matched instructions (Felder & Carlson, 2000).

Thus, it is important for mathematics lecturers in UiTM Pahang to determine students learning style to devise teaching and learning methods to improve students' performance. It is important to be able to assess the learning style of a student though there is no correct learning style (Howard, Carver, & Lane, 1996)

## Study Model - Felder and Silverman's Learning Style Model

The learning style model used in this study is a model developed by Felder and Silverman (1988). According to Felder & Silverman (1988), there are four domains of learning style, that is, active-reflective, sensing-intuitive, visual-verbal and sequential-global. The following table explains the differences between learners in these domains.

Table 1. Types of learners and their learning sStyles (Felder & Silverman, 1988. p.676)

Type of Learners	Characteristics
Sensors	They like facts, data and experimentation, solving problem by standard methods. Gather data through sense, need to see the phenomena before they can understand and appreciate the underlying theory, perception by speculation, imagination and hunches.
Intuitors	Prefer principles and theories, like innovation and dislike repetition, more comfortable with symbols, tends to start answering questions before reading thoroughly and make careless mistakes.
Visual	Remember best when they see. Prefer pictures, diagrams, flow charts and demonstration.
Verbal/Auditory	Remember much of what they hear and more of what they hear and then say, prefer verbal explanation and learn effectively by explaining to others.
Active	More comfortable with active experimentation than reflective observation, work well in groups.
Reflective	More comfortable with reflective observation than active experimentation, Work well by themselves or at most with one person.
Sequential	Learn sequentially, mastering the material more or less as it is presented, strong in convergent thinking and analysis.
Global	Lost for days or weeks until they suddenly "get it", strong in divergent thinking and analysis.

Studies by Felder & Stice (1989, 2000) showed that most professors are themselves intuitors where else 70 percent of the student population were sensors. Based on data taken from the Center for Applied Psychological Type (CAPT), Brightmen (n.d) revealed 64% of 2,282 of the university faculty at Georgia State University were intuitive where else between 56% and 71% of over 16,000 freshmen at three state universities were sensing students. However, he also reported that intuitive students represented almost 83% finalists of the national scholarship in the United States.

Students also had a preference for the way in which they received information. They learn in many ways, like seeing, hearing, and experiencing things first hand. Research (e.g. Arnold et al, 1991; Laird, 1985) suggested that students retain: 20% of what they hear, 30% of what they see,

50% of what they see and hear, 70% of what they see, hear and say, and 90% of what they see, hear, say and do. We all have the capability to learn via all three styles, but for most students, one of these methods stands out. Studies had indicated that most college students were visual learners, whereas teachers in higher education were sending messages in verbal manner (R.M. Felder and L.K. Silverman, 1988) Once again, this discrepancy between learner and teacher could lead to potential problems in the learning process. So a mixture of learning styles seems to be the best way to satisfy the students.

Natural human teaching style is deduction as it is easier to demonstrate in lecture format. This is true for technical subjects at the university. Lecturers normally present principles first, application later. However, as children, we learn inductively which the natural human learning style was. Teaching students in deductive manner can create problems for students who felt that learning at the higher education level were too complex for them to master. If students were allowed to see that the instructor had spent time and effort to come to the generalities, then learning on their part would not be a complicated effort. Law et al. (2000, p.69) in the summary on inductive learning writes:

*The inductive pedagogical approach accompanied by the use of ICT is likely to improve and enhance student's development of cognitive skills and processes by engaging them in exploratory and discovery activities. The inductive strategy produces a sense of excitement in students.*

## Methodology

The objective of this study is to determine the most preferred learning style of the students so that the lecturers can adapt the teaching style that matches the students' preference. The index of Learning Styles (ILS) questionnaire was used as an instrument to determine preferences on the four dimensions of the Felder-Silverman learning style model, i.e active-reflective, sensing-intuitive, visual-verbal and sequential-global. It is a forty-four item forced choice instrument developed in 1991 by Richard Felder and Barbara Solomon and can be found at <http://www.engr.ncsu.edu/learningstyles/ilsweb.html>. The questionnaires were distributed among students from science and social sciences faculties in UiTM Pahang (Table 2). The data was analyzed by MS Excel and the results are as follows.

Table 2. Respondents' profile

	<b>Programmes</b>	<b>No.of respondents</b>
Science & Technology	Diploma in Computer Science	33
	Diploma in Science	27
Science Social	Diploma in Business studies	27
	Diploma in Office Management	23

## Findings

Tables 3, 4, 5 and figure 1 show the results of the four dimensions of learning style for the respondents. Both science and social sciences groups show the same trend for all dimensions. For active and reflective learning styles, the majority of the respondents show mild or moderate preferences on active learning. The same trend was found for sensing and intuition styles. However, there is a high percentage on moderate and strong preferences on visual over verbal for both groups. The majority of respondents from both groups (the science group shows more than 80%) prefer sequential rather than global learning styles.

The majority of respondents from both groups indicate their preference on active learning style. The percentage of those who moderately prefer sensing styles are 21.3% (Table 3) and 26% (Table 4) for science and social sciences group respectively. They have fairly balance preference on visual learning style between science and social science group. About 72.3% and 68% (Figure 1) of the respondents from both science and social sciences groups have moderate to strong preferences for visual learning style.

For the last dimension, sequential and global learning styles, the findings show that the science and social science group prefer sequential styles, 83% and 66% respectively (Table 3 and 4). From the study it showed that the majority of the UiTM Pahang's students were visual (93.8%), sequential (74.5%), active (67.2%) and sensing (64.7%) students (Table 5).

Table 3. Strengths of preferences for Science students

Strength/ Preference	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
Mild	42.6	21.3	27.7	34.0	21.3	4.3	55.3	12.8
Moderate	23.4	6.4	21.3	10.6	34.0	2.1	25.5	2.1
Strong	6.4	0.0	6.4	0.0	38.3	0.0	2.1	2.1
Total	72.3	27.7	55.3	44.7	93.6	6.4	83.0	17.0

Table 4. Strengths of preferences for Social Science students

Strength/ Preference	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
Mild	38.0	30.0	48.0	14.0	26.0	6.0	48.0	26.0
Moderate	22.0	8.0	26.0	10.0	42.0	0.0	18.0	8.0
Strong	2.0	0.0	0.0	2.0	26.0	0.0	0.0	0.0
Total	62.0	38.0	74.0	26.0	94.0	6.0	66.0	34.0

Table 5. Preference of students' learning style.

Strength/ Preference	Active	Reflective	Sensing	Intuitive	Visual	Verbal	Sequential	Global
Total Sc	72.3	27.7	55.3	44.7	93.6	6.4	83.0	17.0
Total SS	62.0	38.0	74.0	26.0	94.0	6.0	66.0	34.0
Average	67.2	32.9	64.7	35.4	93.8	6.2	74.5	25.5

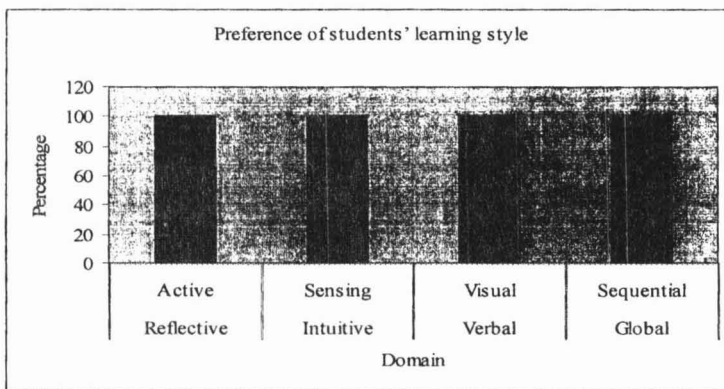


Figure 1. Preferences for Science and Social Science students

## Conclusion

As a conclusion, from this study it showed that the majority of the UiTM Pahang's students were visual, sequential, active and sensing students. The question now is to what extent lecturers are actually capable of accommodating both needs of each individual and the entire class. Balance approach that attempts to accommodate the diverse needs of the students in a class for at least some of the time is the best a lecturer can do. Although it is not expected that the attempt would help all students to the same degree, at least students may be able to obtain some sort of benefit from it. As suggested in previous research, instead of modifying teaching methods to accommodate students' learning styles, the best strategy is to adopt a balanced approach to teaching and to periodically address both sides of each learning style dimension (Felder & Spurlin, 2005; Felder, 1993). When lecturers teach in ways that complement student learning styles, students' performance and motivation increase significantly. Research has indicated that learning improves when teachers adjust their teaching to match the learning styles of their students (Matthews, 1991; Searson & Dunn, 2001). Hence, it is strongly recommended for the mathematics lecturer to administer a learning styles inventory test to students, discuss the finding with their students to identify the strengths and the weaknesses hoping it will enhance the learning process.

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SALIMAH AHMAD, ZAKIYAH OMAR & NURHIDAYAH MASNI ABDULLAH Faculty of Science Computer and Mathematic, Universiti Teknologi MARA Pahang.  
salimah@pahang.uitm.edu.my, zakiyah@pahang.uitm.edu.my,  
nurhidayah@pahang.uitm.edu.my.