The Learning Styles of Electrical Technology Students in Malaysia's Northern Zone

Mazlili Suhaini, Adnan Ahmad

Abstract: This article presents the findings of a study analyzing the learning styles of students in electrical technology (ET) program in a Vocational College (VC) in Northern Zone, Malaysia. The study utilized the Felder-Silverman model and also the Index of Learning Styles (ILS) as a survey instrument. The sample consisted 57 students. The raw ILS responses were collected from the students. Data were analyzed descriptively and compared to both the ET students and to the similar studies done by other researchers. Results from the analysis revealed that the fourth-year students of this college are more visual (91%), active (86%), sensing (61%) and sequential (54%) learners. This study suggest that the college lecturers might align their teaching approaches, method and strategies with the dominant ET students learning style for each dimension in order to make the learning process more meaningful in terms of learning outcomes for learners and lecturers as well.

Keywords : learning styles, Felder Silverman Model, Index of Learning Styles, vocational, electrical technology, preference learning style.

I. INTRODUCTION

Learning styles is the easiest way of learning by an individual [1]. Students will most likely not possess one style exclusively, they may have their own pattern in their learning preferences. A student has a wide range of interests and students with similar interest may have different levels of expertise and because of this, student should not be given the same service in learning [2]. However, the learning style of a student is often taken easily as they assume that students are able to understand the lessons and assignments given by teacher [3]. Less consideration is given to the way students learn and specifically their learning styles especially in vocational fields. R. M. Felder [4] says that teachers prefer to have general learning styles for one subject and basically they instinctively teach with the general learning style for most of the subject. The mismatches between the predominant teaching style or method and the student learning styles could have a negative impact on students especially student's achievement

Moreover, the incompatibility can produce students who are easily bored and not focusing in the classroom; the effect will be faced by the teacher with the results of a low student achievement [5]. In linking students learning styles and knowledge master, they are several researchers agree that learning style influences the improvement of student's achievement [6][7]. Priyaadharshini and Sundaram [8] stated that the mastery of knowledge and problem solving improved when the instructor understood the student's learning style by applying visual teaching methods to the students. The appropriate strategy helps students to complete their competencies easily, reinforce the weak student learning style as well increase the weak students to be more competent in the given assignment.

The teaching strategy or teaching method that corresponds to the learning style is important in vocational fields especially in VC. Students in VC are widely exposed with procedures and work sequence in the most of course competencies. These competencies involve the mastery of knowledge and competence of student's practical skills. A case study by Rahman, Saud, Yamin dan Samah [9] indicate VC students particular in the field of electric only focus on practical rather than theory and this causes the student's knowledge to be inexhaustible. As a competent teacher, they should teach the student thoroughly. Moreover, awareness of learning style appropriate to the students is decisive to VC teacher as it facilitates the teacher to choose the most instructive method or teaching strategy for the student to get good learning outcomes. However, few studies were found that examined learning styles in VC field. The lack of studies in this area indicates a gap in the body of knowledge. To fill the gap, this study will find the dominant learning styles of VC students in ET programs.

II. FELDER AND SILVERMAN LEARNING STYLES MODEL

There are three models of learning style used in engineering education [10][11]. The first model is Kolb's Learning Style Model [12]. In this model, learners are classified into four types which the first type is the converging style (concrete and reflective). The second type is the diverging style (abstract and reflective), while the third type is the assimilating style (abstract and reflective). The fourth type will be the accommodating style (concrete and active). Kolb's theory indicate that learning is a process involving the resolution of dialectical conflicts between opposing modes of dealing with the world as example action and reflection [13]. The second model is Myers-Briggs Type Indicator (MBTI) that was designed by Katherine Cook Briggs and Isabel Briggs Myers [14]. MBTI has often been strongly linked to personality indicators which classifies students through four bipolar discontinuous scales based on psychological types: extraversions – introversion;

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sensing – intuition; thinking – feeling; and judging – perceiving.

The third learning style model is Felder and Silverman Learning Styles Model (FSLSM). Felder and Silverman [15] suggested this model to diagnose the learning style of engineering learners, but it was also used effectively in other fields to infer learning styles [16][17]. The model classifies eight different learning styles with contrasting scales in four different dimensions. The four dimensions of this model are briefly described in Table 1.

Table- I: Dimensions of Learning Style

Dimension	Scale type	Description
Processing	Active	Learn by working in group and handling materials.
	Reflective	Learn by thinking and reflect the information received, work better alone or in small groups among their good friends.
Perception	Sensing	Learner prefer facts, hands-on, love practical with connection to real world, do not like complication, more realistic.
	Intuitive	Learner prefer theories and abstract matters, love to explore any possibility and relationship, they are more innovative, do not like repetition, easy to accept new ideas.
Input	Visual	Learn by remembering what they see: images, diagrams, flow charts, tables, video, Graf and etc.
	Verbal	Learn by remembering what they have heard, read or said.
Understand -ing	Sequential	Learn by following a linear reasoning process such as step by step learning approach (from easy to difficult)
	Global	Learn by looking at the overall picture, absorb information randomly, easy to solve problems quickly but difficult when explaining how they solve it.

Felder and Soloman [18][19] have developed the Index of Learning Styles (ILS) to measure the dimension of student's choice in FSLSM. Each dimension has two opposite characteristics and it emphasize both features. Fig. 1 shows the score for each scale. Score 1-3 brings a fairly balanced to both learning options. Score 5-7 refers to the moderate preference of chosen learning style while the score 9-11 shows a strong preference of chosen learning style.

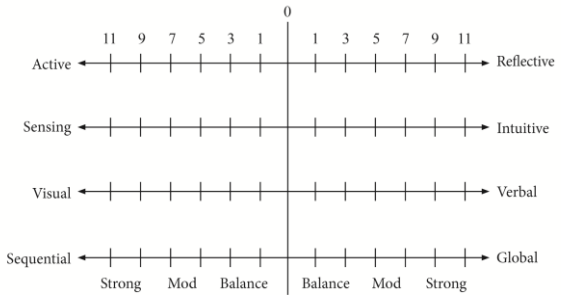

Fig. 1.ILS Scale

III. METHODOLOGY

This research was a descriptive qualitative study using the current FSLSM model of learning style and measuring instrument (ILS) to evaluate ET student's learning styles. The purpose of this study is to evaluate and identify ET student's learning style practiced in VC. This pilot study was conducted at a VC in the Northern Zone of Peninsular Malaysia. The sample consist of 57 fourth year students of Electrical Technology programs. In this study, researcher use the ILS inventory as instrument. Multiple studies have examined the validity and reliability and has proven to have an internal consistency reliability coefficient greater than .50 [20][21][22]. This inventory has been translated by Mohamad [23] from English to Bahasa Malaysia and had been validate once again to identify the reliability value (=.81) for this instrument.

IV. RESULTS AND DISCUSSION

The research question that this study tried to address is, what are the dominant ET student's learning style? The learning style were categorized into four dimensions of learning style. Processing Dimension (visual vs. verbal), Perception Dimension (sensing vs. intuitive), Input Dimension (visual vs. verbal) and Understanding Dimension (sequential vs. global).

A. Processing Dimension (active vs. reflective)

For the Processing Dimension (active vs. reflective), 86% (49) of the student population had an active processor, while only 14% (8) of the student populations had a reflective processor. Of the 86% (49) who had an active preference, 32% (18) were balanced in their preference between active and reflective, 40% (23) had a moderate preference for active vs. reflective learning style, and 14% (8) had a strong preference for active learning style. The mean preference for the active learners was 4.88, with a mode of 5 and a range of 1 to 11. This indicates that ET students in this study had a moderate preference for active learning style.

Among the 14% (8) who process reflectively, 12% (7) were balance in their preference between active and reflective learner, and 2% (1) had a moderate preference for reflective and active learner. There is no strong preference for reflective learner in this study. The mean preference for the reflective learner was 1.75, with a mode of 1 and a range of 1 to 11. This indicates that the reflective learning ET students were balanced between active and reflective learning style. Fig. 2 shows the percentages of the ET Processing Dimension: 86% active vs. 14% reflective and the mean and mode preferences for the ET population on the ILS scale.

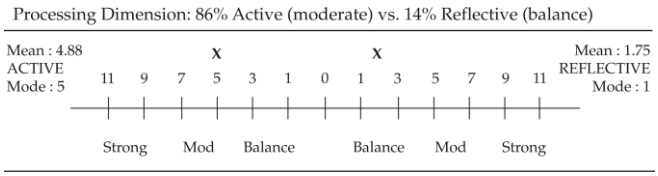

Fig. 2.Processing Dimension

B. Perception Dimension (sensing vs. intuitive)

For the Perception Dimension (sensing vs. intuitive), 61% (35) of the student population were sensing, while 39% (22) of the student populations were intuitive. Among the 61% (35) who were sensing, 37% (21) were balanced in their preference between sensing and intuitive perception, 17% (10) had a moderate preference for sensing perception vs. intuitive, and 7% (4) had a strong preference for sensing perception. The mean preference for the sensing perception was 4.14, with a mode of 3 and a range of 1 to 11. This indicates that the sensing ET students had a balanced to moderate preference for sensing perception learning.

Among the 39% (22) who were intuitive, 17% (17) were balanced in their preference between intuitive and sensing perception, 5% (5) had a moderate preference for intuitive vs. sensing perception, and there is no strong preference for intuitive perception in this study. The mean preference for the intuitive perception was 2.73, with a mode of 1 and a range of 1 to 11. This indicates that the ET students had a balanced preference for intuitive perception learning. Fig. 3 shows the percentages of Perception Dimension: 61% sensing vs. 39% intuitive and the mean and mode preference for the ET population on the ILS scale.

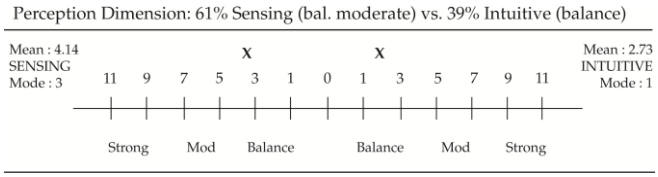

Fig. 3. Perception Dimension

C. Input Dimension (visual vs. verbal)

For the Input Dimension (visual vs. verbal), 91% (52) of the student population were visual input of information, while only 9% (5) of the student population were verbal input of information. Of the 91% who had visual input of information, 19% (11) were balanced in their preference between visual and verbal, 37% (21) had a moderate preference for visual learning vs. verbal learning, and 35% (20) had a strong preference for visual learning. The mean for the visual learners was 6.65, with a mode of 5 and a range of 1 to 11. This indicates that ET students in this study had a moderate to strong preference for visual learning as their input of information.

All of 9% (5) with a verbal input of information were balanced in their preference between visual and verbal. There is no moderate and strong preference for verbal preference in this study. The mean preference for the verbal learners was 1.8, with a mode of 1 and a range of 1 to 11. This indicates that the verbal learning ET students were balanced between verbal and visual as their input of information. Fig. 4 shows the percentage of the ET Input Dimension: 91% visual vs. 9% verbal and the mean and mode preferences for the ET population on the ILS scale.

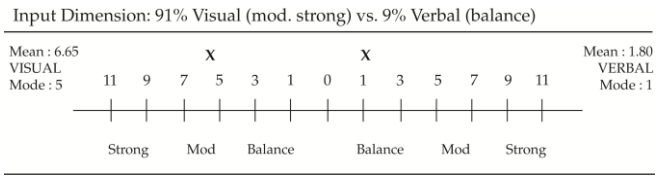

Fig. 4. Input Dimension

D. Understanding Dimension (sequential vs. global)

For the Understanding Dimension (sequential vs. global), 54% (31) of the student population were sequential thinkers, while 46% (26) of the student populations were global thinkers in understanding. Among the 54% (31) who were sequential thinkers, 35% (20) were balanced in their preference between sequential and global understanding, 16% (9) had a moderate preference for sequential understanding vs. global understanding, and 3% (2) had a strong preference for sequential understanding. The mean preference for the sequential understanding was 3.58, with a mode of 1 and a range of 1 to 11. This indicates that the sequential understanding ET students had a balanced preference for sequential understanding.

Of the 46% (26) who were global thinkers, 37% (21) were balanced in their preference between global and sequential understanding, 9% (5) had a moderate preference for global understanding vs sequential understanding, and there is no strong preference for global understanding in this study. The mean preference for global understanding was 2.85, with a mode of 3 and a range of 1 to 11. This indicates that the global understanding ET students had a balanced preference for global understanding learning. Fig. 5 shows the percentages of Understanding Dimension: 54% sequential vs. 64% global and the mean and mode preferences for the ET population on the ILS scale.

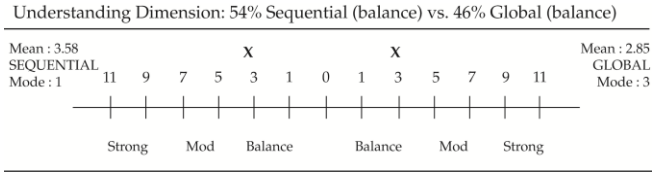

Fig. 5.Understanding Dimension

The results indicate for Processing Dimension, 86% of the ET students had a moderate preference to process the information more actively than to reflect it. They like working in groups. By doing and working hands-on, they learn more not by thinking about the materials given. For Perception Dimension, 61% had a balance to moderate preference in their perception of the information for sensing vs. intuitive response. They tend to learn facts and hands-on than with theories or abstract matters. They are more realistic and love practical with connection to real world. For Input Dimension, 91% of the ET students are moderately to strongly prefer the visual input of information over verbal input of information. The tend to remember more what they see such as images, diagrams, flow charts, video, and graph. For Understanding Dimension, 54% had a balanced preference for sequential understanding.

They learn by following a linear reasoning process such as step by step learning approach (from easy to difficult).

This group accounted for a complete majority of 73% of the ET population. These results concur with Al-Azawei [24], all of engineering students have particular preferences, more specifically active, sensing, visual and sequential. In addition, these findings are comparable to the outcomes of student engineering research [21][22][25]. Fig. 6 shows summarizes the majority average ET learning styles on the ILS scale.

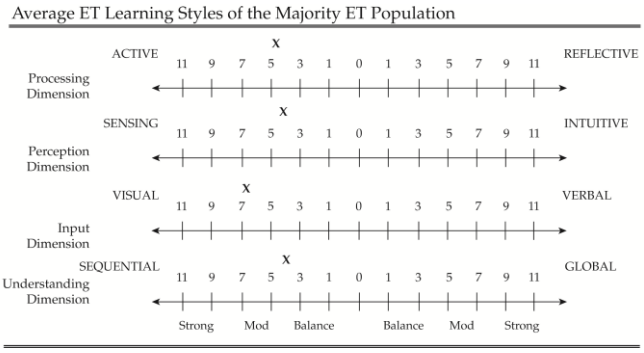

Fig. 6. Majority Population

Other than the majority average learning style, there are the minority average population for ET learning styles. this population consist of 27% of the ET students preferred the verbal, reflective, intuitive and global sides of the learning style dimensions. As we can see, this group of ET students were balanced in all of the learning style dimensions. This group of ET learners balanced in all the aspects of the learning style, indicating that they could work and learn on both sides of the scale [10]. Table 8 summarizes the minority average of ET learning styles on the ILS scale.

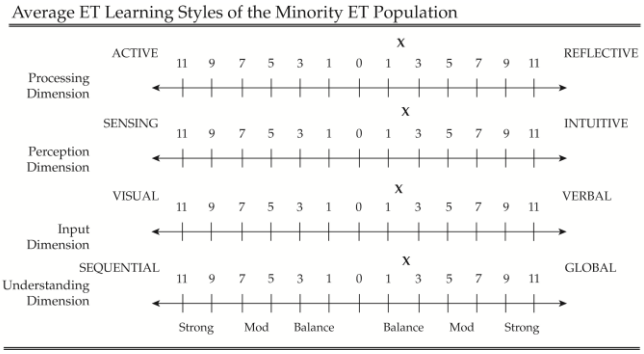

Fig. 7. Minority Population

V. CONCLUSION

Overall, ET students are more visual (91%), active (86%), sensing (61%) and more sequential (54%) learners on average in descending order. This study does not suggest that teacher should disregard the minority of students in the classroom, but rather that the teacher should tailor their teaching style to the majority of the classroom and be aware of the minority. This study showed that in their learning style preference, the minority is balanced and could learn on both sides of the ILS scale. Lecturers need to adjust their teaching style towards student's learning style and this will affect many things in methodologies of ET training. Awareness of ET learning style could provide more thoughts and instrument as preparation for the lecturers to handle the students effectively. It can provide insight into why learners may struggle in a course in which the lecturers use a teaching style that does not match their learning style. The awareness of how to learns and their metacognition is decisive as it is useful for students to get more information about their leaning strength and weakness and how they can improve in their academic [10]. Lecturers should always bear in mind that, a mismatch between learning style and teaching method could affect student's performance academically [26].

A recommendation for lecturers from VC is to utilize ILS in the classroom. By understanding ET student learning styles and match their teaching style, methods or strategy will give a great impact such as student's learning outcome will increase and the learning process will be more effective. This study generates three questions for future research. Whether the factor in learning style influencing the mastery of student learning for vocational field? Is there a correlation between student's learning style and student's performance in knowledge for vocational field? Is there a correlation between student's learning style and student's performance in practical for vocational field?

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