LEARNING STYLES AND PERSONALITY TRAITS OF COMPUTER SCIENCE UNDERGRADUATES IN MALAYSIA

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ABSTRACT
Learners come with diversity in their individual needs and characteristics such as different learning styles and preferences, personality traits and cognitive abilities. The aim of this study is to investigate the relation between the Felder-Silverman learning styles, the Big Five personality traits, and gender among Computer Science undergraduates. 90 students completed a demographic data form, the Index of Learning Styles (ILS), and the Big Five Inventory (BFI). A quantitative research methodology was used to conduct the study. Statistical Package for the Social Sciences (SPSS, version 24.0) was used for statistical analysis. Results have shown that the most common learning style was visual and the majority of students had neuroticism personality trait. There was no significant relationship between gender and learning styles or personality traits. Further finding indicated that there was no significant relationship between the students' learning styles and their personality traits.
Keywords: Learning Styles, Personality Traits, Felder-Silverman Learning Styles, Big Five Traits, Education

INTRODUCTION

One of the major concerns of education sector is looking for ways of how students can learn most effectively and efficiently (Dunn, 1984; Mustafa, 2005; Smith, 1997; U.S. Department of Education, 2012). According to Jonassen and Grabowski (1993), individual differences play a vital role in the design of effective learning environments. Individual differences include different age, gender, cognitive abilities, meta-cognitive abilities, psychomotor skills, personality, anxiety, emotions and affect, cognitive styles, learning styles, experience, background knowledge, motivation, expectations, preferences, and interaction styles (Greenberg & Baron, 2008; Nakic, Granic, & Glavinic, 2015). There has been much research over the past 50 years focusing on individual differences and learning. As the focus on learning has shifted from conventional teacher-centered to student-centered, the issue of how best to support and encourage learners must be considered in order to foster better knowledge delivery. Thus, the individual differences between learners must be taken into consideration by the education practitioners. Our study is focusing on learning style and personality as the most important relationship between person type and learning style can be seen within the structure of personality (Messick, 1994).

The idea of matching learning styles to personality traits is not new (Eysenck, 1978; Fallan, 2006; Furnham, 1992; Highhouse & Doverspike, 1987; Ibrahimoglu, Unaldi, Samancioglu & Baglibel, 2013). Numerous studies have found that there is a correlation between learning styles and personality traits (Busato, Prins, Elshout, & Hamaker, 1999; Eysenck, 1981; Furnham, Jackson & Miller, 1999; Izadi & Rezai, 2015; Jackson & Lawty-jones, 1996; Kim, Roh, & Ihm, 2018; Komarraju, Karau, Schmeck, & Avdic, 2011; Salehi, Hedjazi, Hosseini, & Ebrahimi, 2014; Siddiquei & Khalid, 2018; Sottilare, 2006; Threeton & Walter, 2009). Studies conducted to determine learning styles and personality traits are able to reveal the learning requirements and needs. With the results obtained from the studies, teaching and learning programs could be configured to meet the needs of educators and students, and thus, progress can be made.

The aim of this study is to investigate the correlation between learning styles, personality traits, and gender of public university students. Hence, the following research questions will be answered:

1. What is the predominant learning style and personality trait of Computer Science students?
2. What is the correlation of learning styles and personality to gender?
3. Is there a significant relationship between the students' learning styles and their personality types?

The researchers identified Felder and Silverman learning style model (FSLSM) as a suitable model for learning style classification and the Big Five (BF) personality model is chosen as the personality construct. This topic was investigated for the purpose of providing more information regarding how to better serve the educational needs in the context of (1) adapting individual differences in a development of a holistic curriculum and (2) assisting educators to understand how students learn, thus proper academic guidance can be given to help them in the learning process. The rest of paper constructed as Section 2 reviews all literatures which are related to this

research. Section 3 explains the overview of research methodology. Result of the study is elaborated in Section 4. Section 5 draws the discussion of this study and conclusion is presented in Section 6.

RELATED WORK

The literature related to (1) learning style models with specific reference to the Felder and Silverman learning style model (FSLSM), (2) theories of personality with specific reference to the Big Five (BF) personality model, and (3) the correlation between learning styles and personality traits are discussed in this section.

Learning Style Models

A learning style model classifies students according to where they fit on a number of scales pertaining to the ways they receive and process information (Felder & Silverman, 1988). These models specify a small number of dimensions that collectively provide a good basis for designing effective instruction (Felder, 2010). In addition, a learning style model has a learning instrument accordingly. This instrument enables educational practitioners to classify the students according to their preferred way of learning. Five commonly used learning style models based on Coffield's review (2004) are Kolb Learning Style Model (Kolb, 1984), Honey and Mumford Learning Style Model (1982), Dunn and Dunn Learning Style Model (Dunn & Dunn, 1974), Gardner's Multiple Intelligences Theory (1983), and Felder Silverman Learning Style Model (Felder & Silverman, 1988). Felder's learning style model was selected for this research because it is the most referenced model and widely adopted by technology-enhanced learning systems (Feldman, Monteserin, & Amandi, 2015). The main purpose of Felder's learning style model is to enhance the teaching styles in engineering education as learning styles of most engineering students and teaching styles of most engineering professors are incompatible in several dimensions (Felder & Silverman, 1988). Its strengths are based on the concept of learners' behavioral tendencies and proposed teaching styles, and the fact that it expresses both learning style preferences and the strength of that preferences.

Felder Silverman Learning Style Model

The Felder Silverman learning style model (Felder & Silverman, 1988) is based on Jung's theory of psychological types (Jung, 1921) and Kolb's model (Kolb, 1984). In Felder's model in which developed to describe the learning styles in engineering education, learners are classified into four dimensions: Processing (active-reflective), Perception (sensory-intuitive), Input (visual-verbal), and Understanding (sequential-global). Every dimension of Felder's model defines two opposite learning styles known as poles, see [Table 1].

Table 1: Felder's learning dimensions (Carver, Howard, & Lane, 1999).

Definition	Dimensions		Definition
Do It	Active	Reflective	Think About It
Learn Facts	Sensing	Intuitive	Learn Concepts
Require Pictures	Visual	Verbal	Require Reading Or Lecture
Stey By Step	Sequential	Global	Big Picture

Some of the recent works that employed Felder's model were by Deborah et al. (2015), Yang et al. (2014), Graf and Kinshuk (2013), Pham and Florea (2013), and Saberi and Montazer (2012). This popularity is because of Felder's model:

- describes the learning style of a learner in more detail, distinguishing between preferences on four dimensions (Graf, Viola, Leo, & Kinshuk, 2007; Konert, Gutjahr, Gobel, & Steinmetz, 2014).
- enables practitioners to implement only one or two dimensions of learning style (Crockett, Latham, Mclean, Bandar, & Shea, 2011; García, Amandi, Schiaffino, & Campo, 2007; García, Schiaffino, & Amandi, 2008; Zatarain-Cabada et al., 2010).
- is particularly designed for engineering students and thus, many advanced learning technologies are developed to teach computer science courses (Jeremic´, Jovanovic´, & Gasevic´, 2012; Klašnja-Milićević, Vesin, Ivanović, &, Budimac, 2011; Wang, Li, & Chang, 2006).
- incorporates teaching styles that match preferred learning styles (Felder & Silverman, 1988).

Theories of Personality

Personality is considered as a very important category of individual differences since the individual is often judged depending on his/her personality. According to Messick (1994), personality traits can assist or hinder learning performance depending on the nature and intensity of the personality characteristics. In an online education, extraversion and introversion personality traits may be beneficial in determining student's performance. The introverts perform better in their online learning course (Irani, Telg, Scherler, & Harrington, 2003) than extroverts because the environment itself relies on the absence of verbal communication (Bayless,

2001) and offered additional time for reflection (Downing & Chim, 2004). Similarly, the perceivers and judgers may indicate individual performance as the learner's ability to maintain deadline without instant face-to-face interaction (Rimmerman, 2005). Hence, it suggests that personality plays an essential role for the understanding of individual differences in learning (Keller & Karau, 2013; Pavalache-Ilie & Cocorada, 2014). Furthermore, personality traits seem suitable as underlying factors that explain different typical learning patterns (Vermetten, Lodewijks, & Vermunt, 2001), thus resulting in valuable aspect in educational contexts such as academic performance and motivation.

Big Five Personality Model

The initial Big Five (BF) personality model has been employed by Allport and Odbert (1936). After decades of intensive research, the psychologists are reaching the consensus on using the BF (also known as Five-Factor) model with the five domains of personality traits to describe individual's personality as it is essentially correct in its representation of the structure of traits (McCrae & John, 1992). John and Srivastava (1999) reported that the BF structure does not suggest the reduction the personality differences to only five traits, but it represents personality at the broadest level of abstraction. Each dimension of the model encapsulates a large number of distinct and more specific personality features. The five main domains are openness, conscientiousness, extraversion, agreeableness, and neuroticism, refer [Figure 1]:

- Openness to experience – Curious, intelligent, and imaginative. High scorers tend to be artistic and sophisticated in taste and appreciate diverse views, ideas and experiences. In comparison, low openness indicates that people are practical, traditional, and down-to-earth.
- Conscientiousness – Individual is dependable, careful, responsible, organized and persevering. Conscientious individuals are extremely reliable and tend to be high achievers, hard workers, and planners. They have the relatively low interactions with the social networks to avoid distraction and procrastination.
- Extraversion – Outgoing, amicable, assertive, and talkative. Friendly and energetic, extraverts draw inspiration from social situations. On the other hand, introverts are reserved, serious, and tend to be alone.
- Agreeableness – Cooperative, helpful, and nurturing. People who score high in agreeableness are peace-keepers who are generally optimistic and trusting of others. They tend to be courteous, flexible, forgiving, and avoid conflict. Agreeableness is said to have favourable influence to social interactions and their perceived quality.
- Neuroticism – Individual with low emotional stability shows negative characteristics such as anxious, insecure, and sensitive. Neurotics are moody, tense, and easily tipped into experiencing negative emotions. They usually feel depressed, sad, and not confident.

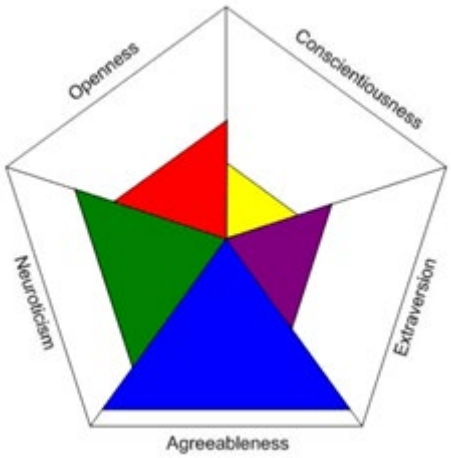

Figure 1: The Big five factors represent an individual's personality (Golbeck, Robles, & Turner, 2011).

Learning Styles and Personality Traits

Many researchers have studied the relationship between learning styles and personality through conventional and automatic approaches, including Eysenck (1978) which indicated that there is correlation between personality traits and learning styles. Meanwhile, Jackson and Lawty-jones (1996) reported that each of the elements of learning styles is related to at least one of the personality traits. Additionally, Furnham et al. (1999) found the relationship between personality traits and learning styles, and have clearly asserted that learning styles are sub set of personality.

In the early days of applying personality concepts in the field of learning, there are two major dimensions of personality are being focused namely neuroticism (N)-stability and extraversion (E)-introversion (Eysenck, 1978). In his work, Eysenck concluded that introverts are better motivated in performance tasks than extraverts, with the condition that their ordinary of effort and attempt and the use of working memory capacity is closer to the maximum (Eysenck, 1981). In other study conducted by Furnham (1992), it is reported that students who are extravert tended to be active in their response to information while introvert students tended to be reflective as predicted. Furthermore, a study investigated by Busato et al. (1999) presented that neuroticism correlated positively with the undirected learning style and negative correlation with the meaning directed and reproduction directed learning styles which was taken from Vermunt's learning styles (Vermunt, 1992, as cited in Coffield, Moseley, Hall, & Ecclestone, 2004).

An increasing research trend of personality roles in the learning process could be seen particularly in the last 25 years. For instance, Highhouse and Doverspike (1987) explored the relationship between college students' learning styles and personality types. They found that Kolb's learning styles are correlated significantly with personality types. On the other hand, Furnham (1992) investigated the relationship between Honey and Mumford's Learning Style Questionnaire (LSQ) and the personality traits in the Eysenck *Personality* Questionnaire (EPQ). The result shows that extravert students are quite clearly activists and pragmatists while introvert students are reflectors. In addition, Furnham also reported that neuroticism moderately correlated with the learning styles and neurotics were more likely to be theorists. In another study conducted by Sottilare (2006), a highly significant correlation between openness and extraversion personality traits and active-reflective and sensing-intuitive learning styles were found. Additionally, Komarraju et al. (2011) have examined a study on the correlation between the BF personality traits, learning styles, and academic achievement. In their study, the Inventory of Learning Processes (ILP) by Schmeck, Ribich, and Ramaniah (1977) has been used as a learning style model which categorized learning styles as synthesis analysis, methodical study, fact retention, and elaborative processing. The results of this study indicated that two of the BF traits i.e. conscientiousness and agreeableness, were positively correlated with all four Schmeck's learning styles, whereas, neuroticism was negatively related with all four learning styles.

The literature showed that the main factors of personality are closely related to learning styles. Hence, throughout the research, it has become clear to researchers and practitioners that there is a significant correlation between learning styles and personality traits.

RESEARCH METHOD

This quantitative research was carried out with a descriptive statistical method to explore the learning styles and personality traits of students and their relation to the variables of gender.

Participants

In the study, 152 students from Universiti Sains Malaysia (School of Computer Sciences) were chosen by the process of convenience sampling. The first year students of Computer Science program who is taking Discrete Mathematics course were given online questionnaires. After the removal of invalid ones, 90 questionnaires were evaluated in total. The sample comprised of 54.4% female (n = 49) and 45.6% male (n = 41).

Instruments

Students completed three online self-report inventories: (1) The demographic data form designed by the first author that gathers participant background information such as name, gender, age, race, and course. (2) Index of Learning Styles (ILS), developed by Felder and Solomon (2003) to identify learning style preferences in Felder's model. (3) Big Five Inventory (BFI) (John, Donahue, & Kentle, 1991), a self-report inventory for identifying personality based on the BF personality model.

Index of Learning Styles

The Index of Learning Styles (ILS) is a 44-items questionnaire with 11 items per dimension and each item has two choices ('a' or 'b', corresponding to one or the other category of the dimension). These learning style preferences were categorized by using values between -11 and +11 for each dimension, and only the odd numbers were suggested in order to characterize each learning style (Felder & Spurlin, 2005). When answering a question, for instance, with a visual preference, +1 is added to the value of the visual/verbal dimension, whereas an answer for a verbal preference decreases the value by 1. Therefore, each question is answered either with a value of +1 (answer 'a') or -1 (answer 'b'). Answer 'a' corresponds to the preference for the first pole of each dimension (active, sensing, visual, or sequential), answer 'b' to the second pole of each dimension (reflective, intuitive, verbal, or global). Thus, using the same example above, if a student's score of 'a' responses is 0 or 1, it

would represent a strong preference for verbal learning, whereas 10 or 11 'a' indicates strong preference for visual learning (Felder & Spurlin, 2005). In addition, if a student's score resulted a balanced value, it shows that the student does not have a specific preference for one of the two poles of a dimension.

Big Five Inventory

The Big Five Inventory (BFI) consists of 44-items questionnaire on typical behaviors or reactions. It measures "neuroticism", "extraversion", "openness", "agreeableness" and "conscientiousness" factors. In the inventory, the five-point Likert-type questions are rated on a five-step scale from 1 (disagree strongly) to 5 (agree strongly). The BFI was developed to represent the prototype definitions developed through expert ratings and subsequent factor analytic verification in observer personality ratings (John & Srivastava, 1999). This inventory has been shown to be a satisfactory tool in associating BF traits with elements in educational context such as motivation (Busato et al., (1999), academic achievement (Komarraju et al. (2011), and predicting learning approaches (Zhang, 2003).

Data Analysis

Statistical Package for the Social Sciences (SPSS, version 24.0) was used to analyze the collected data. First, this study is attempted to investigate the predominant learning styles of Computer Science undergraduates. The first research question was answered by calculating the frequencies and percentages of the ILS and BFI data collected from the completed online questionnaires. The learning style and personality trait with the highest frequency and percentage were identified as predominant. Second, the study sought to examine the correlation between the participants' learning styles and personality traits to gender. To answer the second research question, Chi-square analysis was used to examine the relationship of learning styles and personality according to gender. Finally, to address the third research question, one-way Analysis of Variance (ANOVA) was used to investigate any occurring relationship between learning styles and personality traits.

RESULTS

Findings of the statistical analysis are presented in this section. Table 2 shows the distribution of students' learning styles according to gender. The result of the study suggested that visual learning style was the predominant classification of 71 (78.9%) students within this study. Meanwhile, only 19 students (21.1%) had verbal learning style. Visual and verbal learning styles fall under the same dimension that is Input dimension. This dimension relates to how learners prefer to receive information. Visual learners remember best what they see for examples pictures, diagrams, time lines, films, and demonstrations, while verbal learners remember much of what they hear or read. The statistics also show that male students demonstrated a stronger preference for active (68.3% to 49.0%), sensing (68.3% to 57.1%) and global (39.0% to 36.7%) learning styles compared to female. Contrarily, the female students displayed higher preference towards the other learning styles when compared to male such as intuitive (42.9% to 31.7%), reflective (51.0% to 31.7%), and sequential (63.3% to 61.0%).

Table 2: Distribution of students' learning styles according to gender (n = 90).

	Sensing		**Intuitive**		**Visual**		**Verbal**		**Active**		**Reflective**		**Sequential**		**Global**	
	N	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Female	28	57.1	21	42.9	42	85.7	7	14.3	24	49.0	25	51.0	31	63.3	18	36.7
Male	28	68.3	13	31.7	29	70.7	12	29.3	28	68.3	13	31.7	25	61.0	16	39.0
Total	56	62.2	34	37.8	71	78.9	19	21.1	52	57.8	38	42.2	56	62.2	34	37.8

Chi-square analysis ($p<.05$)

In the study of personality traits variable, descriptive findings indicated that neuroticism personality trait with 55.6 per cent has the highest rate among the students, refer [Table 3]. While the lowest frequency, with 4.5 percent was the agreeableness personality trait. The rest of the students exhibited low level in personality traits of openness (10.0%) and conscientiousness (6.7%), and medium level in extraversion (23.3%).

Table 3: Distribution of students' personality traits according to gender (n = 90).

	Openness		Conscientiousness		Extraversion		Agreeableness		Neuroticism	
	n	*%*	*N*	*%*	*N*	*%*	*n*	*%*	*n*	*%*
Female	6	12.2	4	8.2	11	22.4	2	4.1	26	53.1
Male	3	7.3	2	4.9	10	24.4	2	4.9	24	58.5
Total	9	10.0	6	6.7	21	23.3	4	4.5	50	55.6

Chi-square analysis ($p<.05$)

Pearson correlation analysis was calculated to check significant relationships among the research variables. The results of correlation analysis to examine the relationship between learning styles and gender in Table 4 shows that students' learning styles did not significantly vary according to their gender. Similarly, Table 5 also revealed that personality traits did not significantly vary to gender.

Table 4: Correlation coefficient between learning styles and gender.

Variable	Pearson	Chi-square	Pearson Correlation
	Value	Asymptotic Significance (2-sided)	
Sensing – Intuitive	1.181	.277	.115
Visual – Verbal	3.009	.083	-.183
Active – Reflective	3.413	.065	.195
Sequence – Global	0.050	.823	-.024

Correlation is significant at the 0.01 level (2-tailed)

Table 5: Correlation between personality traits and gender - ANOVA result.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.383	1	1.383	.701	.405
Within Groups	173.506	88	1.972		
Total	174.889	89			

One-way ANOVA (F .701, p>.001)

In addition, Analysis of Variance test (ANOVA) was used to investigate the relationships between students' learning styles and their personality traits. The mean data for each learning styles dimension (Sensing-Intuitive, Visual-Verbal, Active-Reflective, and Sequential-Global) among the five personality traits showed there was no statistically significant difference. It could be seen in Table 6 that Sensing-Intuitive learners had higher conscientiousness scores (F = 0.583, p = .676) than other learning styles. Similarly, Visual-Verbal learners were revealed with higher conscientiousness scores (F = 0.407, p = .803) than other learning styles.

Table 6: Mean (Standard Deviation) of learning styles among personality traits.

Learning Style	Openness (n = 9)	Conscientiousness (n =6)	Extraversion (n = 21)	Agreeableness (n = 4)	Neuroticism (n = 50)	F-ratio
Sensing – Intuitive	1.44 (.527)	1.50 (.548)	1.48 (.512)	1.25 (.500)	1.32 (.471)	.583
Visual – Verbal	3.22 (.441)	3.33 (.516)	3.19 (.402)	3.00 (.000)	3.22 (.418)	.407
Active – Reflective	5.33 (.500)	5.33 (.516)	5.52 (.512)	5.50 (.577)	5.40 (.495)	.378
Sequence – Global	7.22 (.441)	7.33 (.516)	7.43 (.507)	7.25 (.500)	7.40 (.495)	.382

The mean difference is significant at the 0.05 level

Meanwhile, a one-way ANOVA showed that the difference in scores for Active – Reflective learners (F = 0.378, p = .823) and Sequence – Global learners (F = 0.382, p = .821) were not statistically significant. Based on findings of performed study it was cleared that there was no significant relationship between learning styles and personality traits.

DISCUSSION

The present study examined (1) the predominant learning style and personality trait of undergraduates; (2) the variation of learning styles and personality traits according to their gender; and (3) the relationship between their learning styles and personality traits. Learning style and personality are examples of the individual differences in human, in our research scope was students. Identifying students' learning styles is crucial in teaching and learning to help educators to understand how students learn and to provide personalization (Graf & Kinshuk, 2007). Studies conducted to determine learning styles and personality traits have provided valuable information about the relationship between the two of them and must be considered in order to foster better knowledge deliverable.

Descriptive findings indicated that the predominant learning style of the undergraduates was visual learning. The literature explains that the strength of a visual learner is remember best in what they see - pictures, diagrams, time lines, films, demonstrations (Felder & Silverman, 1988). Most college-aged students are visual learners (Clarke, Flaherty, & Yankey, 2006; Kibasan & Singson, 2016) and as we know, complex processes or algorithms and mathematical functions are a bit difficult to understand. Their brains are "wired" differently than older people, thus, they process information in a randomized or networked pattern which allows them to build concept maps (Baker, Matulich, & Papp, 2007). On the contrary, the least learning style is verbal. This is supported by Shuib and Azizan (2015) who observed a strong preference for visual learning style as compared to verbal in Malaysian public university. This explains why students become disinterested and disengaged very

quickly when they are asked to sit through a traditional 50-minute class involving lectures only (Baker, Matulich, & Papp, 2007).

From the results, most Computer Science students were in low level of openness, conscientiousness, and agreeableness personality traits, and medium level of extraversion. The predominant personality trait of the undergraduates was neuroticism. Neurotic person is characterized as having a tendency to have negative emotionality, such as feeling anxious, nervous, sad, and tense (John & Srivastava, 1999). Students might not be attracted to the subjects being taught and less motivated but at the same time they were fear of failure, or of test-taking anxiety (De Raad & Schouwenburg, 1996). Due to that, they were lack of focus and had experiencing studying as stressful. Moreover, it was found that neuroticism is linked with a lack of critical ability and problems in understanding how things relate to each other (Schouwenburg, 1995, as cited in Heinström, 2000). As Computer Science students, they need to learn programming languages and they may find that the languages are difficult to learn. Learning to program is often a process of learning to break a system into its component parts, leaning their individual functions, and working through the relationships between them. Likewise, critical thinking in programming is learning to tackle complex problems and the skill of breaking down tasks and further understand them through their component parts. Failure of doing that leads to rote action. As a consequence, they only concentrate on memorizing the lesson materials so that, they can get through the exams with success. They are just not interested to find a deeper meaning or understanding of the materials, and this is known as surface learning style (Entwistle, 1988). Besides, student population of more women than men also contributes to higher neuroticism in this study. This is aligned with a study by Ireland, Hepler, Li, and Albarracín (2015) where women tend to score higher on neuroticism than men do.

In this study, it was found that learning styles and gender were independent for Computer Science students on all scales. This finding is consistent with previous research that also found no significant relationship between learning styles and gender (ALQahtani & Al-Gahtani, 2014; Escarlos Jr. & Escarlos, 2018; Khan et al., 2018; Kim et al., 2018; Pornsakulvanich, Dumrongsiri, & Sajampun, 2012; Shuib & Azizan, 2015; Siddiquei & Khalid, 2018; Torres, 2014; Yanardöner, Kiziltepe, Seggie, & Sekerler, 2014). The reason for this finding could be partly due to the changing learning environment with increasing technological influences where learners are more and more adapting themselves to such changes, regardless of their gender difference (Shuib & Azizan, 2015). This is supported by Din et al. (2012) who observed that there was no difference between Malaysian male and female undergraduates associated with their ability to acquire meaningful learning experiences through technology. In the relationship between personality traits and gender, it is interesting to note that this study found that personality traits among the learners are not sensitive to gender difference. This finding is consistent with results from Khan et al. (2018), Yanardöner et al. (2014) and Hakimi, Hejazi, and Lavasani (2011). However, Kim et al. (2018) and Siddiquei and Khalid (2018) reached different results in this regard. Gender and MBTI thinking-feeling (TF) variables were statistically significant in Kim et al. (2018) and Siddiquei and Khalid (2018) had found gender differences in three dimensions of personality out of the five: agreeableness, conscientiousness, and neuroticism. These contradictory results perhaps are resulted from differences in cultural beliefs, respondents being studied, gender roles in each society, and clichés within a society (Hakimi et al., 2011).

Finally, most of previous studies pointed out that learning styles had significant relationship to personality traits (Ibrahimoglu et al., 2013; Kamarulzaman, 2012; Komarraju, 2011; Marcela, 2015; Sadeghi, Kasim, Tan & Abdullah, 2012; Salehi et al., 2014). In contrast, our finding revealed that students' learning styles had no significant difference to their personality traits. This is consistent with Khan et al. (2018) and Yanardöner et al. (2014), but it is difficult to compare the correlation results of this study to both of the studies as they utilized different measuring tool i.e. the Learning Style Inventory (LSI) (Kolb & Kolb, 2005). On the surface, there seems to be a link between the individual learning styles and his or her personality. Nevertheless, the use of different models and measuring tools might lead to different result outcome. Another reason for this contradictory results could be due to differences involved in age of participants and cultural.

CONCLUSION

In our study, the relationship between learning styles and personality traits were addressed. The result of the study suggested that respondents in this study have a strong preference for visual learning style as compared to verbal. Whilst there are ongoing debates relating to how education practitioners should consider individual differences such as gender when designing learning materials, this study contrarily has discovered that there were no significant gender differences in the learning styles and personality traits among the students. Finally, the findings of this study revealed that the difference of personality traits and learning styles between male and female learners was not significant as well. Even though some of the results of this study were not consistent with previous studies, they indirectly resembled past research on this topic, that a relationship was found

between learning styles and personality traits. Similar studies, with larger samples of different groups and different statistical methods and variables, they could contribute to the relevant literature.

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