INVESTIGATING THE EFFECT OF GENDER AND FACULTY ON THE LEARNING PREFERENCES OF USIM UNDERGRADUATE STUDENTS

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ABSTRACT

There are many available studies that explain the positive relationship of learning style (LS) to learning performance, and it has been widely accepted that the concept of providing learners with teaching approach and learning materials that inclined towards the preferences of learners will enhanced learning capability. However, despite the abundancy of academic-related literature on the effectiveness of LS identifications, there are still lack of studies on students' learning preferences in a schematic manner in general, and at the Universiti Sains Islam Malaysia (USIM) in particular. This is clinging to the fact that the practice of teaching is still bounded by the traditional methods compared to the innovative alternative methods. In bridging this gap, this paper will collect and analyse the data on learning preferences among USIM undergraduate and investigate the effect of gender and faculty. Fleming VARK Model was utilised in identifying the learning style. This paper shown that the most dominant profiles among USIM undergraduate is quadmodality (VARK) with 61.75% respondent are in this profile group. This research also indicating that gender can pose significant effect towards Aural (A) learning preferences, but not other learning preferences (V, R and K). However, when subjected to the analysis of faculty, only Aural (A) learning preferences are not being affected by the differences in faculties compared to the other three preferences (V, R and K). The importance of this research is to understand the diverse possibility of learning preferences and to draw a holistic learning approach for USIM. One way to achieve this is to provide a buffet of learning materials and a variety of learning activities with multiform that can be executed in a teaching and learning session.

Keywords: Personalise Learning, Fleming VARK, Instructional Model

1. INTRODUCTION

There are many available studies that explain the positive relationship of learning style (LS) to learning performance. For example, Zapalska and Dabb (2002) stated that the understanding of learners' LS will improve the teaching and learning strategies. In addition, awareness on the LS of the learners will aid teachers, instructors, adult, educators, course designers, programme and training developers to develop a curriculum and addresses individual learning needs (Saleh and Shadia, 2013). There are vast definitions of LS but the basic understanding of LS considered as the specific pattern and characteristics which lead to the way of learning strength, weakness, and preferences, although some argue that the term 'learning style' lack the academic clarity with few agreed facts, as claimed by Becta (2005). The vast definition of LS was derived from different focus of research, with all definition however agreed on the effect of LS to the way learners comprehend information.

In the scale of institutional education, knowing the LS alone will only bring infinitesimal change in the teaching and learning. It is when changes are made to the learning process based on learners LS, only then will their learning will be enhanced. This is concurred by Shaari, Yusoff, Ghazali, Osman, & Dzahir (2014) as their research conclude that there is significant but moderate relationship between lecturers' teaching style with the students' academic engagement. Felder and Henrique (1995) also indicate the importance of how a teaching was conducted as the students' readiness and ability to learn is much dependent on the suitability of teaching styles.

Thus, the ability to identify USIM undergraduate learning preferences will allow for a suggestion of the best-fitting learning strategies and learning tools. It is hope that the identification will be beneficial in providing more relevant educational content and information in a faster manner. The concept of mapping the learning strategies and learning tools to learners' LS is in line with the idea of Bajraktarevic, Hall and Fullick (2003) that stated, hypermedia can be seen as advantage or disadvantage in education depending on the level of match between the contents of a course to student LS.

The objectives of this study are:

i. To identify the dominant profiles of learning preferences among USIM undergraduate students.
ii. To investigate whether gender and faculty have significance effect toward the learning preferences of undergraduate students in USIM.

These objectives are important as the first step in understanding the diverse possibility of learning preferences in an educational institution. By acknowledging the overview of learning preferences in USIM, it is hope that this data will be utilised further to build a comprehensive framework for the process of content development in USIM. Data presented can also be integrated with relevant studies on classroom setting with the objective to formulate a possible optimum learning environment and effective teaching and learning setting for future learners.

2. LITERATURE REVIEW

2.1 Learning Styles

As mentioned in the introduction section, LS can simply be defined as a specific pattern and characteristic, which lead to the way of learning. In a formal understanding, LS is defined as a "combination of cognitive, affective and other psychological characteristics that serve as relatively stable indicators of the way a learner perceives, interacts with and responds to the learning environment" (Keefe, 1979; Popescu, Badica, and Moraret, 2010). There are well over 70 different LS schemes (Coffield *et al*. 2004), with six well-known and widely available LS instruments are produced by Kolb, Gregorc, Felder–Silverman, Fleming, and Dunn and Dunn as well as the Entwistle and Tait Revised Approaches (Hawk and Shah, 2007). Most of the LS model are supported by the industries in form of pay-to-use test, manuals, analytical, workshop, and consultancy (Pashler, McDaniel, Rohrer and Bjork, 2008). All of the LS however reverted on the same basic principle that each individual has unique way of learning and perceiving information (called preferences).

Focussing on this paper, Fleming VARK Model will be utilised in identifying the learning style. The early stage of VARK Learning Style and Inventory of LS was developed by Neil D. Fleming, a professor, educator and teacher at Lincoln University, Canterbury, New Zealand; and Colleen E. Mills, professor and academics of the same institution. The development of their model and instruments of LS were published in 1992 and was initially influenced by research in neurolinguistics programming (Leite, Svinicki, and Shi, 2010), although Fleming always stress in his interview and publication that VARK was a result of collective observational experiences as teacher trainers and as an inspector of secondary schools. In 2001, Fleming developed the VARK learning styles inventory to support teachers, trainers and coaches. The development was stemmed from the idea that it is not realistic to expect teachers to provide programmes that accommodate the learning style diversity present in their classes, even if they can establish the nature and extent of that diversity (Fleming and Mills, 1992).

Fleming VARK popularity comes from its face validity, its simplicity, its ease of use, and the wealth of learning materials that have been designed to accompany it. Most users have very practical reasons for using it (Leite *et al*. 2010). This is concurred by Fleming and Mills (1992) as they stated that the model is characterised by its brevity, simplicity, and ability to encourage students to describe their behaviour in a manner they could identify with and accept. The components of this model are as suggested by its name (VARK) which are the acronym for Visual (V), Aural (A), Read/Write (R), and Kinaesthetic (K). The summary of VARK attributes and activities that accommodate each preference are shown in **Table 1**.

Table 1: The summary of VARK attributes and activities that accommodate each preference. (Adapted from Fleming, 2001; Hawk and Shah, 2007)

PREFERENCES	Activities	
Visual	- Diagrams - Graphs - Colours - Charts	- Written Texts - Different Fonts - Design
Aural	- Debates - Arguments - Discussions - Conversations	- Seminars - Music - Drama
Read/Write	- Books, Texts - Handouts - Reading - Bibliographies	- Written Feedback - Note Taking - Essays
Kinaesthetic	- Real-Life Examples - Examples - Guest Lecturers - Demonstrations	- Physical Activity - Constructing - Role Play - Working Models

2.2 VARK Learning Inventory

Several versions of the VARK questionnaire are available via the official website at *http://vark-learn.com/the-vark-questionnaire*. VARK Questionnaire version 7.1 are freely available and frequently found in research that utilised VARK LS. Three version of VARK questionnaire available in the website are for teachers and trainers, younger people, as well as athletes. 16 questions will be asked with four options to be selected as answer. Respondent are allowed to choose more than one answer as some may find that their preferences may be a blend of two, three or all four styles. According to Fleming (2001); Hawk and Shah (2007), it is reported that about 41% of the population who have taken the instrument online have single style preferences or unimodality, 27% have two preferences or bimodality, 9% have three or trimodality, and 21% have a preference for all four styles or multimodality (or also referred as quadmodality).

In regard to the validity and reliability index, Leite *et al.* (2010) claimed that the reliability estimates of the scores of the VARK were adequate, although the study added that additional studies are needed to strengthen the evidence of model fit, and revision or removal of certain items may be necessary to ensure the validity of the VARK scores. Leite *et al.* (2010) also provide estimates of reliability based on Confirmatory Factor Analysis (CFA). The reliability estimates for the scores of the VARK subscales were 0.85, 0.82, 0.84, and 0.77 respectively, which are considered adequate given that VARK are utilised in minimal criticality of decision making.

3. METHODOLOGY

3.1 Sample and data collection method

Random sampling was utilised in the selection of sample among undergraduate student in USIM. The questionnaire was available in both hardcopy and softcopy format with the questionnaire link and hardcopy form was distributed to lecturers and students via email or by-hand delivery. The identification of respondents' faculty and study programme are to investigate the significance of USIM undergraduate LS preferences according to study discipline. Lovell (1980) reported that science students generally preferred a convergent (focused) style of thinking, and that arts students were more likely to be divergent (diverse) thinkers. A study by Jones, Reichard, and Mokhtari (2003), also revealed significant differences in students' learning preferences across English, mathematics, science, and social studies disciplines.

3.2 Instrumentation

There are two classification methods that are in place for the analysis of VARK questionnaire. The most common method is by direct classification based on the highest value point between VARK. A more elaborate method is classifying the preferences to 23 different profiles within four main types of modality as discussed previously. Both methods however rely on the total number of responses for each learning preferences chosen by the respondent. The maximum possible score or value for each preference is 16 as for the number of questions, and the smallest possible value is 0. Respondent is allowed to select more than one option in each question, thus making the maximum possible value is 64; 16 questions times 4 answer options.

A 95% confidence level (when $\alpha = 0.05$) was selected to indicate that there is a 95% probability that it is correct or incorrect to accept the H_0. The H_0 for this research is that gender or faculty will not affect the learning preferences of undergraduates' student in USIM. When the value of *p* is smaller than value of α, it shows that the argument will have enough evidence to reject the H_0, thus indicating that gender or faculty will pose an effect on learning preferences. Statistical analysis of variance (ANOVA) will be utilised in finding the differences between two means.

4. FINDINGS & DISCUSSION

4.1 Overview

Table 2 and **Table 3** shows the summary of demographic data for gender and faculties. Total undergraduate population (N) in USIM is 9,867 and the number of sample (n) collected is 366 or 3.71%. Population data is as of 8th May 2018 and was obtained from the Division of Academic Affairs USIM.

Table 2: The summary of data collected by Gender

CATEGORIES	n	N	% of n to N
Female	257	7,098	3.62%
Male	109	2,769	3.94%
Total	**366**	**9,867**	**3.71%**

Table 3: The summary of data collected by Faculty

CATEGORIES	n	N	% of n to N
Faculty of Economics & Muamalat (FEM)	27	1,614	1.67%
Faculty of Engineering & Architecture (FKAB)	1	239	0.42%
Faculty of Leadership & Management (FKP)	72	1,454	4.95%
Faculty of Major Language Studies (FPBU)	107	914	11.71%
Faculty of Dentistry (FPg)	0	178	0.00%
Faculty of Quranic & Sunnah Studies (FPQS)	42	2,038	2.06%
Faculty of Medical & Health Sciences (FPSK)	0	482	0.00%
Faculty of Science & Technology (FST)	111	1,642	6.76%
Faculty of Syariah & Law (FSU)	6	1,306	0.46%
Total	**366**	**9,867**	**3.71%**

4.2 Preferences by Modality

As explained previously, the makeup of all possible outcome from all preferences will allow for 23 possible profiles with 4 categories of modality. Fleming (1995) indicated that a strong preference would be identified by a score that are at least four points ahead of the second highest score of the same respondent. A difference of one or two points between preferences is not enough.

Table 4: The summary of preferences by modality and the faculty of the respondent.

PROFILE	n	%	Category	FKP	FSU	FEM	FPBU	FPQS	FST	FPSK	FPG	FKAB	Total
V	7	1.91%	Uni-modal	1	-	-	1	1	4	-	-	-	7
A	18	4.92%		4	1	1	7	1	4	-	-	-	18
R	13	3.55%		4	1	1	5	1	1	-	-	-	13
K	3	0.82%		-	-	2	-	-	1	-	-	-	3
Total		**11.20**		**9**	**2**	**4**	**13**	**3**	**10**	**0**	**0**	**0**	**41**
VA	8	2.19%	Bimodal	4	-	-	2	-	2	-	-	-	8
VR	15	4.10%		2	-	-	3	2	8	-	-	-	15
VK	1	0.27%		-	-	-	-	-	1	-	-	-	1
AR	18	4.92%		7	-	2	6	3	-	-	-	-	18
AK	1	0.27%		1	-	-	-	-	-	-	-	-	1
RK	2	0.55%		-	-	-	-	-	2	-	-	-	2
Total		**12.30%**		**14**	**0**	**2**	**11**	**5**	**13**	**0**	**0**	**0**	**45**
VAR	30	8.20%	Trimodal	6	1	2	15	2	4	-	-	-	30
VAK	8	2.19%		1	-	-	1	1	4	-	-	1	8
ARK	11	3.01%		1	-	1	5	2	2	-	-	-	11
VRK	5	1.37%		-	-	1	1	-	3	-	-	-	5
Total		**14.75%**		**8**	**1**	**4**	**22**	**5**	**13**	**0**	**0**	**1**	**54**
VARK	226	61.75%	Quad-modal	41	3	17	61	29	75	-	-	-	226
Total		**61.75%**		**41**	**3**	**17**	**61**	**29**	**75**	**0**	**0**	**0**	**226**
Total	**366**	**100%**		**72**	**6**	**27**	**107**	**42**	**111**	**0**	**0**	**1**	**366**

From **Table 4**, it is shown that the most dominant profiles are quadmodality or a mix up of all four component (VARK) with 61.75% respondent are in this profile group. Gap between the number of respondents with unimodality (11.20%), bimodality (12.30%) and trimodality (14.75%) profile is small as the differences between the highest scores to the lowest is only 3.55%.

4.3 Preferences by Gender

Table 5 to **8** are showing the result of analysis for gender with the significant value (*p*) at 95% confidence level ($\alpha = 0.05$).

a) Data on Visual (V) preferences by Gender

Table 5: The *p* value (0.056) is indicating that there is not enough evidence to reject the H_0. From this result alone, we can conclude that gender do not pose significant effect towards visual (V) learning preferences.

GENDER	N	Group Mean	Std Deviation	*p*
Female	257	6.066	3.380	0.056
Male	109	5.349	2.998	

b) Data on Aural (A) preferences by Gender

Table 6: The *p* value (0.013) is indicating that there is enough evidence to reject the H_0. From this result alone, we can conclude that gender can pose significant effect towards Aural (A) learning preferences.

GENDER	N	Group Mean	Std Deviation	*p*
Female	257	6.751	3.035	0.013
Male	109	5.899	2.832	

c) Data on Reading / Writing (R) preferences by Gender

Table 7: The *p* value (0.120) is indicating that there is not enough evidence to reject the H_0. From this result alone, we can conclude that gender do not pose significant effect towards reading / writing (R) learning preferences.

GENDER	N	Group Mean	Std Deviation	*p*
Female	257	6.572	3.121	0.120
Male	109	6.046	2.522	

d) Data on Kinaesthetic (K) preferences by Gender

Table 8: The *p* value (0.937) is indicating that there is not enough evidence to reject the H_0. From this result alone, we can conclude that gender do not pose significant effect towards kinaesthetic (K) learning preferences.

GENDER	N	Group Mean	Std Deviation	*p*
Female	257	5.027	3.250	0.937
Male	109	5.055	2.670	

4.4 Preferences by Faculty

Table 9 to **12** are showing the result of analysis for faculties with 95% confidence level ($\alpha = 0.05$).

a) Data on Visual (V) preferences by Faculty

Table 9: The *p* value (0.000) is indicating that there is enough evidence to reject the H_0. From this result alone, we can conclude that faculty do strongly play a role towards Visual (V) learning preferences among undergraduates' students.

FACULTY	N	Group Mean	Std Deviation	*p*
FEM	27	6.815	3.386	
FKAB	1	8.000	0.000	
FKP	72	5.111	3.191	
FPBU	107	4.748	2.761	0.000
FPQS	42	5.524	3.278	
FST	111	7.234	3.267	
FSU	6	6.500	3.782	

b) Data on Aural (A) preferences by Faculty

Table 10: The *p* value (0.104) is indicating that there is not enough evidence to reject the H_0. From this result alone, we can conclude that faculty do not play a role towards Aural (A) learning preferences among undergraduates' students.

FACULTY	N	Group Mean	Std Deviation	*p*
FEM	27	7.704	3.314	
FKAB	1	10.000	0.000	
FKP	72	6.625	3.032	
FPBU	107	5.935	2.654	0.104
FPQS	42	6.786	2.959	
FST	111	6.477	3.036	
FSU	6	7.333	5.046	

c) Data on Reading / Writing (R) preferences by Faculty

Table 11: The *p* value (0.018) is indicating that there is enough evidence to reject the H_0. From this result alone, we can conclude that faculty do strongly play a role towards reading / writing (R) learning preferences among undergraduates' students.

FACULTY	N	Group Mean	Std Deviation	*p*
FEM	27	7.667	3.486	
FKAB	1	5.000	0.000	
FKP	72	6.431	2.940	
FPBU	107	5.636	2.843	0.018
FPQS	42	6.452	2.856	
FST	111	6.793	2.858	
FSU	6	7.500	3.146	

d) Data on Kinaesthetic (K) preferences by Faculty

Table 12: The *p* value (0.000) is indicating that there is enough evidence to reject the H_0. From this result alone, we can conclude that faculty do strongly play a role towards kinaesthetic (K) learning preferences among undergraduates' students.

FACULTY	N	Group Mean	Std Deviation	*p*
FEM	27	6.074	3.689	
FKAB	1	9.000	0.000	
FKP	72	4.528	2.813	
FPBU	107	3.841	2.450	0.000
FPQS	42	5.024	2.552	
FST	111	6.252	3.232	
FSU	6	4.667	5.007	

5. CONCLUSION AND FUTURE RECOMMENDATION

The requirement of identifying learners' LS stem from the idea that most people have specific preferences, and individuals' learning preferences differ from one to another. But by knowing the LS alone will not bring any changes in the teaching and learning processes. Thus, come the question on how to utilise available data of LS as catalyse for teaching and learning improvement. Retrospecting at the overall theme of this study, the identification of LS is only the initial steps in improvising teaching and learning. It is also important to note that this research is aiming to understand the diverse possibility of learning preferences and to try to draw a holistic learning approach for USIM. At the end of this research, the following conclusions were reached:

- The most dominant profiles among USIM undergraduate is quadmodality (VARK) with 61.75% respondent are in this profile group.
- Gender can pose significant effect towards Aural (A) learning preferences (with 0.013 significant difference), but not the other learning preferences (V, R and K).
- Faculty do not pose significant effect toward Aural (A) learning preferences (with 0.104 significant difference) compared to the other learning preferences (V, R and K).

From the first figure where it shows that 61.75% of USIM undergraduate students are in the quadmodality profile group, we can suggest that USIM students are ready for universal learning environment and have the capability of appreciating a multi-format content. This figure may also suggest that teaching and learning process and the materials provided to the learners should be inclusive of all four preferences to ensure comprehensive learning experience. This data may also suggest that the classroom should be optimised accordingly to accommodate all components of learning preferences. It will also be advisable for the teachers to introduce different learning methods that representing different learning preferences from time to time to ensure that all learners (including the minority group) will have an adequate option in choosing their preferred materials. The need to produce teaching materials or strategies that are free from gender and faculty bias transpire as indicated from the result obtain in the analysis of gender and faculty. However, a targeted content for a specific interest group may not necessarily to be universal in nature.

Although a more holistic analysis is required to suggest the best learning solutions, this research is hoping to have promoted the idea of providing a buffet of learning materials and a variety of learning activities with multiform that can be executed in a teaching and learning session. Providing learners with an arrays of learning materials may have an impact on the classroom learning environment and the types of learning activities that can possibly be executed in a session. As suggested by Fleming, the VARK statistics and result are not the deciding factor for an effective learning, as they are a result rather

than a cause. The result provided by this research can only encourage the learners to know themselves better, and to allow for a room to grow with the advancement of education. At the same time, it is hope that this research will encourage teachers, instructors, educators, course designers, programme and training developers to continue to produce multi-format learning content, or to venture into new learning strategies, and even to experiment with new teaching assistance and teaching tools.

Looking at the future perspective of this research, the available data can be utilised to further investigate the correlation between LS to a specific learning strategies and learning tools. These match-up processes are seen as beneficial in producing a holistic database for teachers or instructors in USIM for the production of contents. It will also be beneficial to increase the sample size to produce a better result that will represent all members of faculties. The product of this relations or a relationship model will then can be programmed to form a computerised model or a Suggestive and Personalise Educational Instructional Model (SPEIM). SPEIM is proposed to allow for the improvement on the preparation of teaching materials by providing a more structured focus on the ability to select the most appropriate learning objects to a specific modality of preferences. Further enhancement of this study will also allow for the integration of SPEIM into the learning management system (LMS) of the university.

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