Gender Comparison on the Factors Affecting Students' Learning Styles

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Abstract: - This study analyzed the gender comparison on the factors affecting students' learning style. The data were collected using a survey form which was distributed randomly. The number of respondents was 189 students. The methodologies used were descriptive statistics, factor analysis and non-parametric technique using the Kruskal-Wallis test. The results showed seven new factors were successfully constructed using factor analysis and assigned as the factors affecting the learning style activity; which are 1) students' behaviour before and after attending class, 2) strategies used to comprehend the lecture, 3) the importance of lecture, 4) class size and its condition, 5) efforts outside class, 6) classroom convenient and 7) importance on listening to lecture. The Kruskal-Wallis test results showed there was a significant mean difference between gender on students' efforts outside class (factor 5) while there was no significant mean difference between genders on the other factors of students' learning style.

Key-Words: - learning style; factor analysis; Kruskal-Wallis; gender

1 Introduction

Many researchers believe that when students are taught with good learning styles, the students' academic performance will improve significantly. Dunn and Dunn (1993) suggested that it is not fair if one learning style such as study in a group was forced to all students. This is because it can reduce the student performance that has preference on other learning style [1].

Ayersman (1996) stated that findings found in books and journals showed that if learning environments are carefully planned and includes the learning styles, then the academic performance will increase [2]. Dyver (1996) reported that in whatever the learning environments, the process should be planned by focusing on the inviduals preference learning styles [3].

Comeaux (2005) suggested that academic performance was affected by the facilities provided by the faculty in a college. Students with learning facilities had better academic performance compared to others. In his study, there was a positive correlation between students' academic performance with the environment facilities provided by his faculty [4].

Davidson (2002) reported that learning style correlates with the learning outcome and student's academic performance [5]. According to Hussein (1993), academic excellence is students' achievements which are based from university's assessments such as test, assignments, presentation, final exam and etc [6].

A research was done by Abdul Halim Mohammad and Wan Mohamad Wan Sulong (2003) between students' hobby and behaviour towards learning Arab language. The research was done to university undergraduate students who studied Arab language. The findings showed that students'

behaviour and hobby towards studying Arab language were very importance in determining the students' successfulness. This shows that behaviour towards study influences the students' academic performance [7].

In Malaysian, students' academic excellence is very much valued as most parents assume that their child's academic success would guarantee a life success. It is because having a good qualification will ensure them to get a good job with a high remuneration. This is parallel with Hussein (1993) that having academic excellence is correlated with good life [6]. Based on that, students are expected to have a good academic excellence as a failure to have might lead to other problems such as high rate unemployment rate and low socio economic income.

Hence, it is significant to study and divulge factors affecting students' learning styles which may influence students' academic performance. This study analyzed the gender comparison on the factors affecting students' learning style.

2 Materials and Method

The data were collected using a survey form which was distributed randomly. SPSS was used to perform statistical analysis of the data collected from the survey forms. The methodologies used were descriptive statistics, reliability analysis, factor analysis and non-parametric technique using the Kruskal-Wallis test.

McClave *et al.* (2005) defined descriptive statistics utilizes numerical and graphical methods to look for patterns in a data set, to summarize the information revealed in a data set, and to present the information in a convenient form [8].

Altman *et al.* (2006) stated that pilot study was a small experiment done to test the logic and to improve the information quality and efficiency collected from big study [9]. Coakes and Ong (2011) suggested that reliability analysis was used to determine the internal consistency of the scales using Cronbach's Alpha [10].

Chua (2009) suggested that factor analysis is the procedure which always been used by the researchers to organise, identify and minimise big items from the questionnaire to certain constructs under one dependent variable in a research [11].

Carver and Nash (2006) stated the Kruskal-Wallis H test is the nonparametric version of the one factor independent measures ANOVA [12].

3 Results

The number of respondents who participated in this study was 189 students. The collected data was significant because it was distributed to quite a big sample size. Coakes and Ong (2011) stated the minimum sample size was five for one variable, in addition, a one hundred sample size is acceptable, and however a sample size more than two hundred is much more acceptable to fulfil the factor analysis [10].

The results are divided to several subsections which are descriptive statistics, reliability analysis, factor analysis and non-parametric technique using the Kruskal-Wallis test.

3.1 Descriptive Statistics

Table 1 shows the profile of the respondents. There were 58 male students (30.7%) and 131 female students (69.3%).

Table 1. Profile of the respondent

Demographic factor		Frequency
Gender	Male	58 (30.7%)
	Female	131 (69.3%)

3.3 Reliability Analysis

In this study, the main focus is to look at the factors that affecting students' learning style among the undergraduate students. The reliability analysis result showed that the Cronbach's Alpha was 0.663 for 29 items.

Mohd Salleh Abu and Zaidatun Tasir (2001) stated that the reliability coefficient more than 0.6 is always used [13]. Kroz *et al.* (2008) stated the Cronbach's Alpha value for questionnaire should be between 0.65 until 0.75 [14]. Since the reliability analysis result showed more than 0.65, therefore, there were internal consistency of the scales. Hence, this instrument used in this study had a high reliability value.

3.3 Factor Analysis

Bartlett's test of sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy are both tests that can be used to determine the factoriability of the matrix as a whole. The results value of Bartlett's test of sphericity is significant ($p<0.001$, $p=0.000$). In addition, the Kaiser-Meyer-Olkin measure is 0.775 which is greater than 0.6.

Coakes and Ong (2011) suggested that if the Bartlett's test of sphericity is significant, and if the Kaiser-Meyer-Olkin measure is greater than 0.6, then factorability is assumed [10]. Thus, based from the results, it is appropriate to proceed with Factor

Analysis to examine factors that affecting students' learning style among the undergraduate students.

Table 2 displays the total variance explained at seven stages for factors that affecting students' learning style among the undergraduate students. Seven factors were extracted because their eigenvalues greater than 1. When seven factors were extracted, then 60.216 percent of the variance would be explained.

Table 2. The Total Variance Explained

Factor	Rotation Sums of Squared Loadings		
	Total	Percentage of Variance	Cumulative Percentage
1	3.088	15.439	15.439
2	2.162	10.810	26.248
3	1.602	8.011	34.259
4	1.461	7.304	41.563
5	1.283	6.413	47.976
6	1.231	6.154	54.129
7	1.217	6.086	60.216

Table 3 shows the rotated factor matrix for the questionnaire. Tabachnick and Fidell (2001) stated variable with factor loadings more than 0.45 were chosen in this study because loadings equals to 0.45 is considered average, whereas loadings 0.32 is considered less good [15].

After performing Varimax Rotation Method with Kaiser Normalization, Factor 1 comprised of five items with factor loadings ranging from 0.54 to 0.8. The items in Factor 1 are S9, S4, S10, S6 and S1. Factor 2 comprised of five items with factor loadings ranging from 0.48 to 0.72. The items in Factor 2 are S5, S11, S7, B5 and S8. Factor 3 comprised of three items with factor loadings ranging from 0.32 to 0.83. The items in Factor 3 are E2, B2 and B3. Factor 4 comprised of two items with factor loadings ranging from 0.73 to 0.74. The items in Factor 4 are E3 and E4. Factor 5 comprised of three items with factor loadings ranging from 0.56 to 0.62. The items in Factor 3 are S2, B1 and S3. Each of Factor 6 and Factor 7 comprised of one item. The factor loadings are 0.9 and 0.5 respectively. The item in Factor 6 is E1 and the item in Factor 7 is B4.

Table 3. Rotated Factor Matrix

Item	1	2	3	4	5	6	7
S1	0.8						
S4	0.73						
S10	0.71						
S6	0.56	0.34					
S9	0.54	0.32					
S8		0.72					
S11		0.6					
S7	0.3	0.58					
B5		0.53				0.4	0.3
S5	0.34	0.48					0.4
B2			0.83				
B3			0.8				
E4				0.74			
E3				0.73			
S3	0.44				0.62		
B1	-0.4				0.61		
S2				-0.4	0.56		
E1						0.9	
E2			0.32				-0.7
B4	0.3	0.31					0.54

Seven new factors were successfully constructed using factor analysis and assigned as the factors affecting the learning style activity. Table 4 shows the name of the new factors and percentage of variance explained for each of the factors. The first factor shows the highest percentage of variance explained when it was extracted. When the first factor, students' behaviour before and after attending class was extracted, then 15.439 percent of the variance would be explained.

Table 4. Name of New Factors with the Percentage of Variance

Factor	Name	Percentage of Variance
1	Students' behaviour before and after attending class	15.439
2	Strategies used to comprehend the lecture	10.810
3	The importance of lecture	8.011
4	Class size and its condition	7.304
5	Efforts outside class	6.413
6	Classroom convenient	6.154
7	Importance on listening to lecture	6.086

3.4 Normality Test

The seven new that affecting students' learning style among the undergraduate students were tested using the normality test. Table 5 shows the results of the normality test for the seven new factors that affecting students' learning style among the undergraduate students.

Coakes and Ong (2011) suggested that when the significant p-value for the variable is bigger than 0.05 ($p>0.05$), then the data is normal [10]. The Tests of Normality results using the Kolmogorov-Smirvnos showed that the normality assumption for the seven new factors did not fulfil the normality assumption ($p< 0.05$).

Table 5. Normality Test for the New Factors

Factor	Statistic	df	Sig.
Factor 1	0.079	189	0.006
Factor 2	0.090	189	0.001
Factor 3	0.073	189	0.016
Factor 4	0.072	189	0.018
Factor 5	0.059	189	0.020
Factor 6	0.104	189	0.000
Factor 7	0.076	189	0.010

3.5 Kruskal-Wallis Test

The non-parametric test using the Kruskal-Wallis Test had been performed on all new seven factors because the factors did not fulfil the normality assumption. The non-parametric test using the Kruskal-Wallis Test was performed to test the mean difference between the genders on factors that affecting students' learning style among the undergraduate students. The first alternative hypothesis statement is, there is a significant mean difference between genders on factors that affecting students' learning style among the undergraduate students.

Table 6 shows the results of the non-parametric test using the Kruskal-Wallis Test for the seven new factors that affecting students' learning style among the undergraduate students. The results showed there was a significant mean difference between gender on students' efforts outside class (Factor 5), ($X^2=4.17$, $p<0.05$, $p=0.04$). The results showed that there was no significant mean difference between genders on the other factors of students' learning style ($p>0.05$).

Table 6. Kruskal-Wallis Test for the New Factors

Factor	*Chi-Square*	*Asymp. Sig.*
Factor 1	0.367	0.545
Factor 2	0.532	0.466
Factor 3	0.000	0.991
Factor 4	0.388	0.533
Factor 5	4.167	0.041
Factor 6	0.288	0.592
Factor 7	0.104	0.747

Table 7 shows the mean rank for Factor 5, the students' efforts outside class. The mean rank for female students spent more effort outside class was 100.4 compared to male students only 82.79. Female students spent more effort outside class in searching extra academic references compared to male students.

Table 7. Mean Rank for Students Effort Outside Class (Factor 5)

Factor 5		N	Mean Rank
Gender	Male	58	82.79
	Female	131	100.4

4 Conclusion

The results showed seven new factors were successfully constructed using factor analysis and assigned as the factors affecting the learning style activity; which are 1) students' behaviour before and after attending class, 2) strategies used to comprehend the lecture, 3) the importance of lecture, 4) class size and its condition, 5) efforts outside class, 6) classroom convenient and 7) importance on listening to lecture.

There was a significant mean difference between genders on students' effort outside class (factor 5). Female students spent more effort outside class in searching extra academic references compared to male students. There was no significant mean difference between genders on the other factors of students' learning style.

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