International Journal of Asian Social Science
ISSN(e): 2224-4441/ISSN(p): 2226-5139

Special Issue: International Conference on Teaching and Learning in Education, 2013

journal homepage: http://www.aessweb.com/journals/5007

LEARNING STYLE AND COURSE PERFORMANCE: AN EMPIRICAL STUDY OF UNITEN IT STUDENTS

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ABSTRACT

Many tertiary education institutions struggle in identifying how best to teach students to learn statistics. Finding factors which advocate successful and effective learning is considered vital in any tertiary education institutions. Numerous studies have been conducted within the context of teaching and learning in order to determine the factors that contribute to a better learning environment. This includes determining how various learning styles affect students' performance. By knowing students' learning preferences, the course instructor can assimilate necessary course delivery methods which suit students' learning style preferences, thus enhancing the learning experience. This paper intends to examine the relationship between learning styles and course performance in Statistics course of IT students in Uniten. Thirty (30) IT students in Statistics for Computing class in Semester 2 2012/2013 participated in this study. They were asked to complete the Visual Auditory Kinaesthetic (VAK) learning style self-assessment questionnaire. Based on the assessed learning styles, all participants preferred single sensory modality with 37% are Visual (V) learners, 26% are Auditory (A) learners and 37% are Kinaesthetic (K) learners. The performance of the students in all three (3) learning styles was analyzed by using both parametric and non parametric tests due to the small sample size. Both tests yield the same result; it was found that there was no statistical significant relationship between learning style and course performance.

Keywords: Statistics, Performance, IT students

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ISSN(e): 2224-4441/ISSN(p): 2226-5139

1. INTRODUCTION

The quality of undergraduate education especially in Information Technology (IT) field is important due to the competitiveness of IT industry nowadays. In order to differentiate their graduates, many tertiary education institutions embed critical and analytical thinking by introducing statistical course in their undergraduate programs. However, many strive to identify the best pragmatic approach to promote effective and successful learning experience in statistical course. Numerous studies had evolved since the last few decades in finding what factors contribute towards a successful learning environment. Majority of them lies within the context of teaching and learning which includes examining the effects of various learning styles on students' performance. Learning style assessment provides an overview to course instructors on how the students receive and process information, thus assisting the instructors to deliver course materials by using approaches which suit the students' learning styles. Many studies found that when instructors deliver course materials using the learning styles that are preferred by students, learning is enhanced and the course performance improves. This paper intends to examine the relationship between learning style and course performance of Uniten IT students in a Statistics course.

2. BACKGROUND

Statistics is a discipline or branch of mathematics dealing with the collection, analysis, interpretation and presentation of data from any random experiment (Peiris, 2012). To encourage critical and analytics abilities among students, many tertiary education institutions require their students to take Statistics as part of their course degree program. According to Garfield and Ben-Zvi (2008), statistical course is considered as the course which provides ideas and methods that could be utilized by students in order to better understand their environment at university and beyond. Additionally, Utts (2003) highlighted that educated citizen should poses basic statistical knowledge in order to detect any misuse of statistics by policy makers, physicians and others.

Learning statistics however is not as easy as learning typical mathematical course. Historically, statistics education has been viewed by many students as difficult and unpleasant to learn, and by many instructors as frustrating and unrewarding to teach (Garfield *et al.*, 2002). Hence, it is crucial that the instructors take extra initiatives to ensure they are effectively delivering the course content to the students. Research shows that student motivation and performance improve when class deliverables are adapted to their preferred learning styles (Miller, 2001). Another study done by Laight (2004) supports this finding.

Learning style preferences are the manner in which, and the conditions under which, learners most efficiently and effectively perceive, process, store, and recall what they are attempting to learn (James and Gardner, 1995). There are many methods of identifying learning styles. One of the most preferred methods is by using sensory modality that one prefers to use when receiving information. There are three (3) major sensor modalities defined by our neural system which are Visual (V), Auditory (A) and Kinesthetic (K). Students who are V learners learn best by observing. This group of learners understands better by using drawings, pictures, diagrams and demonstration. A learners best learn by listening to audio such as recorded lectures and discussing with classmates. K learners learn more by performing physical activities. This VAK classification was further extended by

Fleming (1995) to include another category which is Read-Write (R), to be identified as VARK. R learners learn best through interaction with textual materials.

2.1. Problem Statement

Finding the relationship between learning style and course performance has become the objectives of numerous researches since early decades. To the day, there are many studies conducted in this context. A recent research conducted by Dobson (2010) investigated the relationship between preferred learning style, gender, and course scores in an undergraduate physiology class. The result from the study showed that there was a significant relationship between preferred sensory modality and course scores.

A study done by Yari (2012) however found that there was no relationship between learning preference and final results of Iranian EFL learners. Similarly, a study by Prajapati *et al.* (2011) on optometry undergraduates also found that learning style did not influence students performance. These findings do provide some insight on the relationship of learning style and course performance but do not contribute much towards teaching and learning statistical course as learning statistical course is different.

One such study was performed by (Kamuche, 2011) in a Basic Statistics class. However, his study included the instructor's learning style as an additional factor in examining the students' performance. The study found that there was a strong linear relationship between students whose learning style matches the instructor's teaching styles and students' test performance.

In this study, we altered Kamuche's approach by excluding the instructor's learning style factor in evaluating the influence of learning style on students' performance in a Statistics course. As mentioned in his findings, more further studies are needed in different institutions and disciplines (Kamuche, 2011), hence this study was carried out with the interest of providing more empirical research in the teaching field of Statistics. The hypotheses for this study were defined as follows:

H_0: There is no relationship between learning style and course performance of Uniten IT students
H_1: There is a relationship between learning style and course performance of Uniten IT students

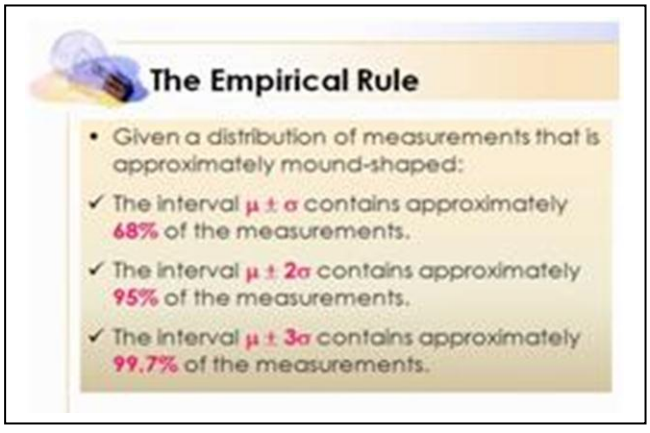
3. RESEARCH METHODS

3.1. Sample

There were thirty (30) undergraduate IT students in Uniten participated in this study: 19 males and 11 females. The students were enrolled in CGNB293 Statistics for Computing class in Semester 2 2012/2013. All students were from the same section of the course. There were a total of 171 students who enrolled in CGNB293 class in that semester.

Majority of the students who participated in the study were first year students of College of Information Technology (COIT). The teaching approach adopted for the course mainly was visual as the instructor extensively utilized power point presentation for delivering course materials. A sample of course material is illustrated in Figure 1.

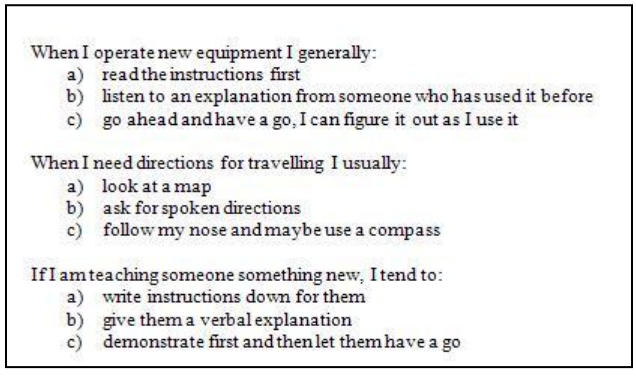
Figure-1. A sample of power point slides used in class



3.2. Questionnaire

Each participant was provided with a paper copy questionnaire. The questionnaire used in this study was VAK Learning Preferences Self-Assessment Questionnaire which consists of two (2) demographic questions and thirty (30) multiple choice VAK questions. The demographic questions were gender and age. Figure 2 depicts an extraction of VAK self assessment questionnaire.

Figure-2. Selected questions from VAK self assessment questionnaire



3.3. Course Assessment Results

The course assessment for the course was carried out throughout the Semester 2, 2012/2013. There were four (4) quizzes, eight (8) lab exercises, one (1) midterm test, one (1) assignment and one (1) final exam which made up the total course assessment. The assessment distribution for quizzes, lab exercises, midterm, assignment and final exam were 20%, 15%, 10%, 5% and 50% respectively. The total score used for this study was the sum of the mentioned weighted assessments scores.

3.4. Data Collection and Analysis

The VAK self assessment questionnaire was distributed to IT students during lecture time in early Semester 2 2012/2013. Students were informed of the purpose of the study by the instructor and thirty (30) of them were willing to participate in the study voluntarily. The students' preferred

learning styles were determined immediately after they completed the questionnaire. At the end of the semester, the instructor wrote down the total scores of the students who participated in the questionnaire and transferred individual preferred learning style, demographic information and course total scores to an electronic file for viewing and analysis.

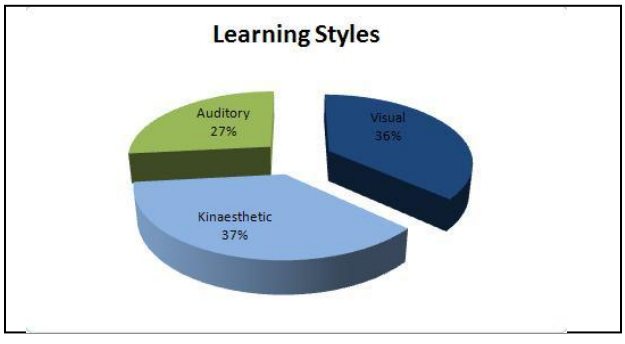
Once the data had been finalized, statistical association between gender and learning style was drawn using χ^2analysis. Statistical analysis between the three (3) assessed learning styles and course scores were completed using ANOVA and Kruskal-Wallis.

4. RESULTS

Of the participated IT students, 63% were males and 37% were females. Their age range was between 19 to 21 years old.

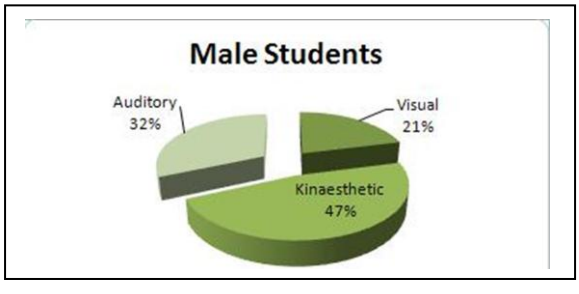
No analysis was done on age since the range is considered minimum. From the VAK self assessment result, all students preferred single sensory modality. 37% students were Visual (V) learners, 37% found themselves as Kinaesthetic (K) learners and the other 26% were Auditory (A) learners. A summary of VAK classification is displayed in Figure 3.

Figure-3. Learning style preference

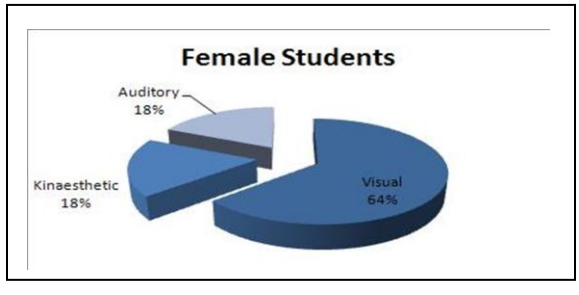


A gender analysis for each learning style was carried out and the result is displayed in Figure 4. Majority of male students were K learners, while majority of female students were V learners.

Figure-4. Learning style preferences for (a) male students and (b) female students



(a)

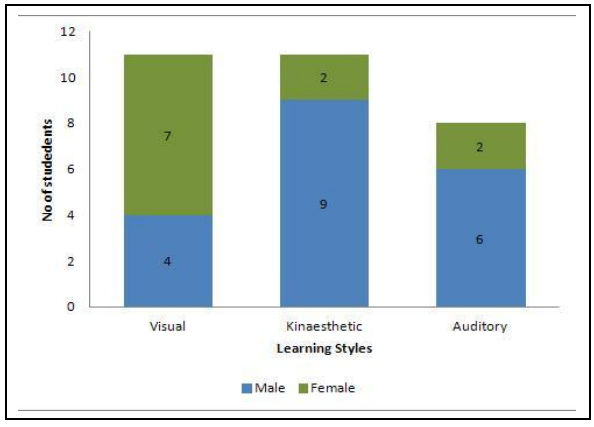


(b)

The result was later tabulated on a bar graph as illustrated in Figure 5, and at a quick glance, there seemed to be a relationship between learning style preference and gender.

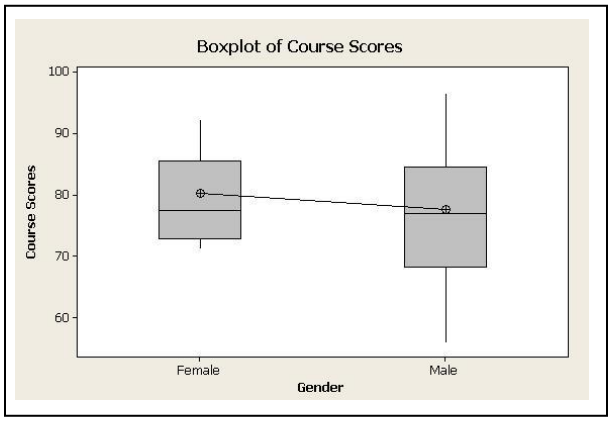
A further analysis performed between learning style and gender however indicated that there was no significant relationship between the two variables (χ^2= 5.533, P = 0.063).

Figure-5. Gender and learning style preference



Course total scores based on gender were analyzed graphically using box plot. From the box plot, the total scores range for male was found to be higher than female's (refer Figure 6). This perhaps was due to higher number of male students in this study. The mean for both male and female students were about the same, which gave an early indication of no relationship between total scores and gender. Subsequently, one-way ANOVA analysis was carried out to confirm that there is no statistical significant relationship between the two variables (F=0.54, P=0.468). In order to see whether the small sample size had any influence on the result, we also analyzed the data by using Kruskal-Wallis test. As predicted, it was found that there was no significant relationship between course scores and gender (H=0.7, P=0.401).

Figure-6. Box plot of gender versus scores

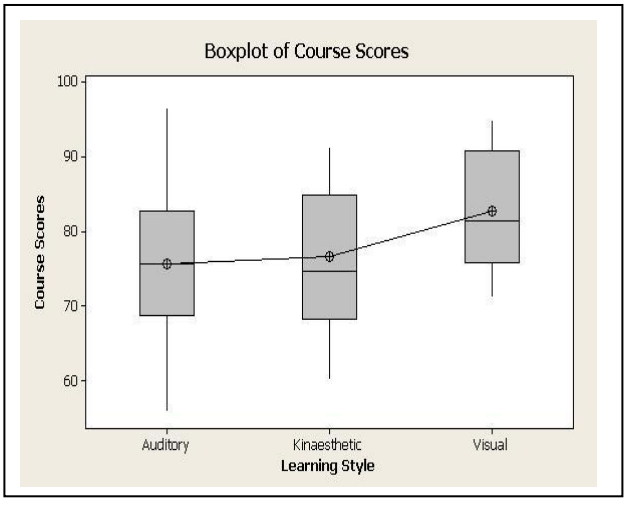


The final analysis was done to find the relationship between course performance and different learning styles. The total scores distribution for each learning style category was illustrated using box plot as in Figure 7. From the box plot, it can be inferred that the mean and median scores of V learners were only slightly higher than that of A and K learners, which conveyed that there was no

relationship between learning style preference and total scores. To investigate whether the difference was insignificant, ANOVA test was carried out, taking into account the effect on the smaller sampling size of A learners. As expected, there was no statistical significant relationship found between course scores and learning style (F=1.63, P=0.215).

The data again was tested using Kruskal-Wallis test to cater for small sample size impact, and similarly, it was found that there was no statistical significant relationship between the two variables (H=3.2, P=0.202).

Figure-7. Box plot illustration of learning style preference versus total scores



5. DISCUSSIONS

Although the study conducted by Dobson (2010) did find a significant relationship between the course performance and learning style, the study on IT students in Uniten provides evidence that there was no significant relationship between the course performance and learning style. This finding is consistent with the studies done by Yari (2012) and Prajapati *et al.* (2011). However, it should be noted that this study was conducted using a sample of thirty (30) IT students in a statistics course, which is quite small for an empirical study.

Course scores are known to be normally distributed, and using a small sample size might cause type II error, as small sample size tends to have much larger, positive effect than studies with larger sample sizes (Slavin and Smith, 2008). Additionally, in this study, the course instructor used mainly visual teaching materials in class, which might had influenced the results obtained by V learners. The course scores used in the analysis were accumulated throughout the semester, and the result might be different if only scores obtained during final examination was considered.

In the study, it was observed that all IT students who participated happened to prefer single sensory modality, which might not true in general population.

With a larger sample size, there might be students who prefer multiple sensory modalities such as VK or AK or AV and perhaps VAK. The result from this study was also influenced by gender as the gender distribution was not equal across the three learning style categories.

Hence, similar nature of studies should be further expanded perhaps by using equal number of female and male students to exclude gender biasness factor. Finally, this study used volunteers rather than random participants, and this might have influenced the obtained result.

Thus, more studies need to be carried out by taking into account the limitations which have been discussed in order to produce a more justified conclusion on the relationship between learning style and course performance.

6. CONCLUSION

Promoting an effective and successful learning environment is the ultimate goal of many tertiary education institutions. Course instructors must have the flexibility to incorporate various teaching methods in order to accommodate multiple modes of students learning style preference. Although this study showed there was no statistical significant relationship between learning style and course performance in a Statistics course, knowing the learning style of students can help in promoting effective and successful learning environment towards producing high quality IT graduates for the industry.

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