THE RELATIONSHIP BETWEEN LEARNING STYLES AND MULTIPLE INTELLIGENCES AMONG MALAYSIAN MEDICAL AND HEALTH SCIENCES STUDENTS

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ABSTRACT

Most studies on learning styles (LS) and multiple intelligences (MI) have predominantly been conducted in a single institution. Comparative studies involving two or more medical schools are currently lacking and the correlation between LS and MI have not been sufficiently established. This study was a multidisciplinary and multi-institutional study on the LS and MI of medical and health sciences students from three Malaysian universities using the VARK questionnaire and MI Inventory respectively.

Differences in the mean VARK subscale scores and mean MI domain scores according to gender, race, first language, family income and academic achievements were analysed while age and the pre-university cumulative grade point average (CGPA) were correlated to these mean scores. The mean VARK subscale scores were also correlated to the mean MI domain scores. The most powerful indicator of LS and MI were determined using a path analysis.

Both interdisciplinary and inter-institutional differences in LS and MI were observed. Overall, a majority of the students were unimodal learners. The most common type of learners was the reading/writing type whereas the kinesthetic subscale had the highest mean score. Regardless of disciplines and universities, all cohorts of students had the highest mean score in the intrapersonal domain and the lowest mean score in the verbal/linguistic domain.

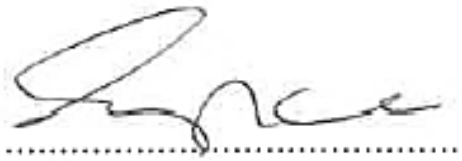
All demographic factors played a role in the learning preferences and MI to a varying extent, except for family income, which had no influence on LS. Learning preferences did not differ significantly between high and non-high achievers. However, statistical significant differences in the mean existential, kinesthetic and interpersonal domain scores existed between high and non-high achievers.

Path analysis showed that the most powerful predictor of LS and MI was the first language and age respectively (combining all medical and health sciences students from University A), and gender and family income respectively (combining all Year 1 medical students from all three universities). A statistical significant correlation between all VARK subscales with at least one or more MI domains existed. Interestingly, none of the VARK subscales correlated to the interpersonal domain.

The presence of interdisciplinary, inter-institutional and individual differences implies that different teaching approaches are necessary in medical and health sciences education. Although most learners preferred a unimodal approach in this study, multi-sensory learning should be encouraged as it helps students to learn better and enhances memory retention. A consistently low verbal/linguistic score implies that there is a need to help medical and health sciences students to improve their English language proficiency whereas a lack of correlation between the interpersonal domain with any of the VARK subscale implies that non-conventional learning methods such as inter-professional learning or cooperative learning are necessary for the development of interpersonal skills among these students.

APPROVAL PAGE

I certify that I have supervised /read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in quality and scope, as a thesis for the fulfilment of the requirements for the degree of Doctor of Philosophy.



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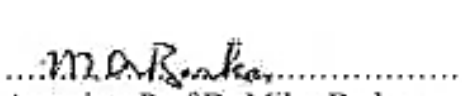

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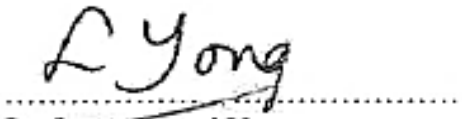

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DECLARATION

I hereby declare that the thesis submitted in fulfilment of the PhD degree is my own work and that all contributions from any other persons or sources are properly and duly cited. I further declare that the material has not been submitted either in whole or in part, for a degree at this or any other university. In making this declaration, I understand and acknowledge any breaches in this declaration constitute academic misconduct, which may result in my expulsion from the programme and/or exclusion from the award of the degree.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
AVE	Average Variance Extracted
BDS	Bachelor of Dental Science
BPharm	Bachelor of Pharmacy
CGPA	Cumulative Grade Point Average
GDS	Gregorc Style Delineator
ILS	Index of Learning Style
IQ	Intelligence Quotient
LS	Learning Styles
LTM	Learning Type Measure
PBL	Problem-Based Learning
PILS	Pharmacists' Inventory of Learning Styles
PLS	Partial Least Square
MBBS	Bachelor of Medicine and Bachelor of Surgery
MBTI	Myers-Briggs Type Indicator
MI	Multiple Intelligences
MMC	Malaysian Medical Council
MQA	Malaysian Qualifications Agency
SCCL	Student-Centred Collaborative Learning
SPSS	Statistical Package for the Social Sciences
STPM	Sijil Tinggi Persekolahan Malaysia (English: Malaysian Higher School Certificate)
VARK	Visual, Auditory (or Aural), Reading/writing, Kinesthetic

CHAPTER 1.0 INTRODUCTION

Medicine, dentistry and pharmacy are demanding courses in which learning is a challenging process for the students. As how people approach learning will inevitably have an impact on their learning outcomes, it is therefore, crucial to understand the learning preferences of the learners in order to facilitate them learn efficiently. Although a student's intelligence undoubtedly plays an important role in the learning process and academic achievement, the traditional perception of intelligence mainly focuses on one's verbal/linguistic or logical/mathematical skills and capabilities. Nevertheless, in order to excel in medicine and health sciences, these capabilities alone are not sufficient. Hence the concept of multiple intelligences is highly relevant and applicable in medical and health sciences education.

1.1 Background of the Study

Medical and health sciences education plays an important role in the training of doctors and healthcare professionals of tomorrow. Due to the ever-changing context of medical and health sciences education, there is a shift of the traditional teacher-centred approach to the newer learner-centred approach (McLean & Gibbs, 2009). Hence, the term "learner-centred learning" has become very common in the past few decades. As its name implies, the main focus of "learner-centred learning" is on the students, whereas the teachers are to play the role of a facilitator (Dornan *et al.*, 2005). Different ways or methods of learning have been used in medical and health sciences education to encourage learner-centred learning. One classical example is the popular application of problem-based learning (PBL) in medical and health sciences education (Badeau, 2010; Taylor & Miflin, 2008).

When designing the curriculum for challenging and expensive courses such as medicine, dentistry and pharmacy, there is always the challenge of costs versus quality. Many resources have to be invested to ensure high-quality teaching in these courses. While there is no such thing as a perfect or one-size-fits-all curriculum, improvement is possible if the learners are being taken into consideration in the process of curriculum design and review, or when decisions on the mode of delivery are made.

Many factors can affect how a person learns. These factors may include student-, teacher- and environmental factors. Therefore, the preferred learning styles and multiple intelligences play an important role in the student's learning process. For example, the preferred learning styles have been found to have an influence on a person's academic performance and achievement (Cassidy, 2004; Demirbas & Demirkan, 2007).

On the other hand, multiple intelligences are not exactly the same as learning styles but they share some similarities in that both theories promote individual differences and the learner-centred approach. Howard Gardner first introduced the multiple intelligences theory in 1983 in the book "Frames of Mind' (Gardner, 1983). His model divides intelligence into several specific modalities or domains rather than a single general ability. To date, a total of nine modalities or domains have been described. These are the naturalist, musical/rhythmic, logical/mathematical, existential, interpersonal, bodily/kinesthetic, verbal/linguistic, intrapersonal and visual/spatial "intelligences" (Gardner, 1999; Kanthan & Mills, 2006).

There is substantial research on multiple intelligences in different fields. Despite differences between multiple intelligences and learning styles, one's learning style may be influenced by his or her multiple intelligence domains (Armstrong, 2000; Campbell, 1994).Understanding one's multiple intelligences helps one to better

understand one's learning style as learners with a dominance in different domains tend to learn better using a matching learning style (Giles, Pitre & Womack, 2003).

To this end, several studies have looked into the learning styles of medical (Shah *et al*, 2011; Zeraati, Hajian & Shojaian, 2008), pharmacy (Teevan, Li & Schlesselman, 2011), and dental (Fang, 2002) students in various parts of the world, while comparative studies on the learning styles of medical and health sciences students are relatively fewer in the published literature with only some sporadic reports (Engels & de Gara, 2010; Hardigen & Cohen, 2003). In Hardigen and Cohen's (2003) comparative study, the instrument used was the Myer's Briggs Type Indicator (MBTI), and the study did not involve medical students. On the other hand, Engels and de Gara (2010) only compared the learning styles of medical students, general surgery residents and general surgeons, and the instrument used in the study was the Kolb Learning Style Inventory.

The present study is different from the previous studies in that it focused on the comparison of learning styles between medical and health sciences students using the VARK questionnaire, and the disciplines assessed also varied considerably. Besides, it was carried out in more than one medical school in Malaysia, making it the first multi-institutional study in the country. Thus far, multi-institutional studies on learning styles and multiple intelligences of medical students are very much lacking in Malaysia and other parts of the world. A vast majority of studies merely investigated students from a single university.

In addition, much fewer studies have investigated the multiple intelligences of medical and health sciences students when compared to those on learning styles (Ahmad, Abdul Kasim & Palaniappan, 2006; Kanthan & Mills, 2006; Katzowitz, 2002). Ahmad, Abdul Kasim and Palaniappan (2006) mainly focused on the nature of multiple intelligences among dental students and the relationship between multiple

intelligences and the performance of various dental skills. Katzowitz's study (2002) investigated the learning styles and multiple intelligences of students from six allied health programs (medical assistant, respiratory therapy, practical nursing, vascular technology, diagnostic medical sonography and radiologic technology). These studies differ considerably when compared to the present study, i.e. Ahmad, Abdul Kasim and Palaniappan (2006) focused on a single type of students (i.e. the dental students) and Katzowitz's study mainly focused on allied health students of different programs, which were not the subjects of this study.

Due to a lack of data, this study aimed to determine both the learning styles and multiple intelligences of first year medical students and students from different types of health sciences programs, namely dentistry and pharmacy enrolled at University A. It also aimed to determine if a positive or negative correlation existed between learning styles and multiple intelligences among these students. As the study also investigated the preferred learning styles and multiple intelligences of medical students from two other Malaysian universities, it provides insight into the learner characteristics of Malaysian medical students, which contributes important information to research in the field.

1.2 Problem statement

The curriculum of medical and health sciences education has always been regarded as very challenging and costly. In order to train doctors and healthcare professionals of tomorrow, a great amount of resources are being applied to ensure that the curriculum is of the highest possible standard. There is no one-size-fits-all curriculum, taking into consideration that every student is unique. It is important to take the students' preferred

learning styles and multiple intelligences into consideration before one designs or makes adjustments to the curriculum. Such data is currently lacking in University A.

Although several studies have looked into the learning styles of medical and health sciences students, there are relatively inadequate studies in the published literature comparing the learning styles among medical and health sciences students from dentistry and pharmacy with a glaring deficit of data on the multiple intelligences of medical and health sciences students. Moreover, the correlation between learning styles and multiple intelligences among these students have not been sufficiently established.

Since every individual is unique and has his or her own preferred learning styles and may be more dominant in one or more multiple intelligence domains, it is beneficial to investigate these two aspects of different cohorts of students. From the practical point of view, this will not only help the students to better understand their own learning preferences and strengths in terms of their multiple intelligence domains, more importantly, it will also help the teachers involved to take these factors into consideration when it comes to designing a new curriculum or modifying an existing one. The teachers involving in these courses will also be able to apply the appropriate teaching methods based on the characteristics of their students, especially for those who are cross-teaching several programs.

In addition, Malaysian studies on the preferred learning styles and multiple intelligences have predominantly been conducted in a single university. Data on comparative studies involving two or more medical schools is currently lacking. This study, therefore, helps in adding novel and new knowledge to the field. It covered a larger population which is more representative of the current situation in medical education.

Medical and health sciences education were selected as the main theme of this study because there is a deficit in the existing literature in this area of research in Malaysia, especially for multiple intelligences. To date, there are more than thirty medical schools in Malaysia and more than 9000 new medical doctors were produced in the year of 2013. However, a multi-institutional study investigating the learner characteristics of medical students had not been conducted in the past. The present study fills in the research gaps and will enhance the understanding of medical educators and researchers on the nature of students enrolled in medical programs in various medical schools in the country.

First year students were selected as the target population because they were fresh from secondary schools and pre-university programs. It is interesting to investigate the learning styles of these fresh university students shortly after they had been exposed to the university curriculum, which allows one to determine the differences in learning styles and multiple intelligences among fresh university students from different pre-university backgrounds.

Last but not least, an investigation of the factors affecting learning styles and multiple intelligences of medical and health sciences students using a path analysis is uncommon in the published literature. The use of such an analytical method would certainly be a positive addition to the existing literature in this area of research.

1.3 Objectives

The general objectives of this study were (i) to investigate the learning styles and multiple intelligences of medical and health sciences students from Universities A, B and C, (ii) to investigate the factors affecting learning styles and multiple intelligences, (iii) to investigate the effect of learning styles and multiple intelligences on academic

achievement and (iv) to establish the relationship between learning styles and multiple intelligences of medical and health sciences students.

Below were the specific objectives of this study:

i. To determine the preferred learning styles of medical and health sciences students from University A, C and C.

ii. To determine the differences in mean VARK scores:

(a) between Year 1 and Year 2 medical students in University A,

(b) among Year 1 medical, pharmacy and dental students in University A and

(C) among Year 1 medical students in Universities A, B and C.

iii. To determine if demographic factors have an influence on the mean VARK subscale scores among medical and health sciences students from Universities A, B and C.

iv. To determine if there are differences in the mean VARK subscale scores according to academic achievement among medical and health sciences students from Universities A, B and C.

v. To determine the multiple intelligences of medical and health sciences students from Universities A, B and C.

vi. To determine the differences in mean MI domain scores:

(a) between Year 1 and Year 2 medical students in University A,

(b) among Year 1 medical, pharmacy and dental students in University A and

(c) among Year 1 medical students in Universities A, B and C.

vii. To determine if demographic factors have an influence on the mean MI domain scores among medical and health sciences students from Universities A, B and C.