RESEARCH PAPER

LEARNING PREFERENCES OF MEDICAL STUDENTS - A STUDY CONDUCTED AT THE UNIVERSITY OF PERADENIYA, SRI LANKA

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Abstract

Background: Each student has a unique way of learning. These preferred learning approaches are believed to have an influence on student learning and academic performance. Identifying the learning preference of students is important as it would inform the teachers of the most suitable way of engaging students.

Objectives: To determine the learning preference of medical undergraduates of the University of Peradeniya, Sri Lanka and to identify whether there is a significant difference in the learning preference based on gender, academic seniority and academic performance.

Methods: Six hundred medical undergraduates of the University of Peradeniya, Sri Lanka were assessed using paper copies of the VARK questionnaire. Data were analysed using SPSS.

Results: The response rate was 94%. The number of multi-modal learners (56.6%) was significantly higher than uni-modal learners (43.4%). All multi-modal learners were quad-modal learners and a majority had a high preference for VARK type 1 (switching from mode to mode depending on the context) learning style (35.4%). A significant proportion of uni-modal learners had a visual preference (28.9%) with few having auditory, read/write and kinaesthetic preferences. There was no significant difference between males and females in their learning preference. There was a trend towards becoming more multi-modal as they progress to senior years. A majority of second upper class achievers (61.5%), second lower class achievers (50.9%) and passed students (65.9%) showed a multi-modal learning preference. However, there was no significant difference in preference for uni-modal or multi-modal learning among first class holders.

Conclusions: Most medical undergraduates of the University of Peradeniya, Sri Lanka preferred multi-modal (quad-modal) and visual type of learning. There was no significant relationship between gender, academic seniority and learning preference. There was an apparent kinaesthetic preference among high achieving students with no auditory or read/write preference.

Introduction

The learning processes of individuals vary due to differences in cognitive processing [(1)]. A certain preference to a mode of learning is the habitual manner in which a student prefers to gather, process, interpret, organize, and think about material or gain a skill. It is postulated that the compatibility between a student's learning preference and the delivery of information is conducive for understanding, processing, and retaining information [(1, 2)]. Each student has a unique way of learning and these preferred learning

approaches are believed to have an influence on student learning and academic performance [3, 4].

The VARK questionnaire is an accepted, standardized, reliable tool which measures learning preferences of individuals. It categorizes learners as Visual (V), Aural (A), Read/Write (R) and Kinaesthetic (K) with combinations identified as uni-modal, bi-modal, tri-modal and multi-modal learning preferences. This further categorizes multi-modal learners as VARK Type one (learners switch from mode to mode depending on what they are working with), VARK Type two (learners who gather information from each mode before acting) and VARK transition (learners who fall in between VARK type one & VARK type two)[5].

Teaching medicine is an ever-evolving process, which requires that both students and teachers continuously update themselves [6]. The "meshing hypothesis" states that the learning outcomes would be favourable if learning was matched with the predominant learning preference of the learner [7, 8]. Identifying learning preference of students is important as it would inform the teachers of the most suitable way of engaging students [9].

Published data regarding learning preferences of medical students are sparse in Sri Lanka. Secondary education in schools in Sri Lanka is largely didactic and lecture based, encouraging students towards auditory and read/write learning styles. Even though student engagement within the medical course too is dependent heavily on lectures, it may be preferable to identify the learning styles of the Sri Lankan 21st century learner [6]. An in-depth understanding of the preferred modes of learning would be beneficial for medical teachers to improve their delivery of learning materials by developing a sound learning strategy which can enhance the motivation of the students towards learning medicine. It is also anticipated that this information would help in tailoring class room instruction to suit the needs of undergraduate medical students in a more efficient and cost-effective manner [9].

Objectives

To determine the learning preference of medical undergraduates of the University of Peradeniya, Sri Lanka and to identify whether there is a significant difference in the learning preference based on gender, academic seniority and academic performance.

Materials and Methods

Paper copies of the latest version (v7.8) of VARK (visual, auditory, read/write & kinaesthetic) international questionnaire were administered to 600 randomly selected medical students subsequent to obtaining permission from its author. This comprised of 125 students from four batches admitted to the University of Peradeniya, Sri Lanka. Information on gender, academic year and the academic performance (based on 1st class, second class upper division, second class lower division and pass) was included to the original questionnaire. The questionnaire was administered within the faculty following a lecture by a pre intern doctor. The students were informed that participation was purely voluntary in nature and that the data would be used for research purposes. The students were allowed to choose multiple answers per item to adequately describe their preferred response(s). The total number of student responses were tallied for each of the four sensory modalities (V, A, R, and K) and for all possible combinations of the modalities (e.g., VA, VRK, etc.).

The responses to a single question were scored to identify each student's modality

preferences for each question according to the protocols developed by the authors of the questionnaire. Data were recorded in the electronic spread sheets together with demographic data.

Data were categorized using SPSS to determine the prevalence of different learning preferences among medical undergraduates. Furthermore Chi square test was carried out to determine whether there was a statistically significant relationship ($P< 0.05$) between different learning styles and gender, academic year and academic performance.

Ethical clearance for the study was granted by the ethical review committee of the Faculty of Medicine, University of Peradeniya (Research protocol 2015/EC/36).

Results

Out of the 600 participants, 564 responded (94%). Seventy one percent (395) were female. Data on gender was missing in 5 individuals. Twenty seven percent (149) were 1st year, 26% (145) 2nd year, 29% (164) 3rd year and 18% (102) were 4th year students. Data on academic year was incomplete in 4 individuals. The academic performance of the students, were as follows; 9% (24) had first classes, 20% (52) second upper classes, 21 % (55) second lower classes and 51% (135) had general pass marks. Data on academic performance was missing in 298 individuals.

Learning preference as a whole (n=560)

Of the study participants,56.6% (317) were multi-modal learners while 43.4% (243) were uni-modal learners **(Table 1)**. The number of multi-modal learners were significantly higher than uni-modal learners (Chi square 19.557; P=0.00). There were no bi-modal or tri-modal learners.

A majority of multi modal learners preferred VARK type 1 learning while a majority of uni-modal learners had a visual learning preference. Kinaesthetic, auditory and read/write preferences were rare.

Learning preference and gender (n=559)

There was no statistically significant difference between males and females in their learning preference (Chi-square1.266; P=0.260)

However, a majority of males (34.1%) demonstrated a Visual preference while majority of females demonstrated VARK type 1 preference (38.2%)**(Table 2).**

Learning preference and academic seniority (n=560)

There was no significant difference in the learning preference according to academic seniority (Chi square1.266; P=0.260) **(Table 3)**.

Table 1. Learning preferences of medical students according to VARK profiles (n=560)

Multi-modal (n=317)			**Uni-modal (n=243)**			
VARK1 (%)	VARK2 (%)	VARK3 (%)	V (%)	A (%)	R (%)	K (%)
198 (35.4)	73 (13.0)	46 (8.2)	162 (28.9)	15 (2.7)	10 (1.8)	56 (10)

V-Visual, A- Aural, R-Read/Write, K-Kinaesthetic, VARK 1- learners switch from mode to mode depending on what they are working with VARK 2- learners who gather information from each mode before acting, VARK transition (3) - learners who fall in between VARK type one & VARK type two

Table 2. Comparison of learning preferences according to gender (n=559)

	Multi-modal			Uni-modal			
	VARK1	VARK2	VARK3	V (%)	A (%)	R (%)	K (%)
Male (n=164)	47 (28.7)	20 (12.2)	20 (12.2)	56 (34.1)	7 (4.3)	2 (1.2)	12 (7.3)
Female (n=395)	151 (38.2)	53 (13.4)	26 (6.6)	105 (26.6)	8 (2.0)	8 (2.0)	44 (11.1)

V-Visual, A- Aural, R-Read/Write, K-Kinaesthetic, VARK 1- learners switch from mode to mode depending on what they are working with VARK 2- learners who gather information from each mode before acting, VARK transition (3) - learners who fall in between VARK type one & VARK type two

Table 3. Comparison of learning preferences according to academic year (n=560)

		1st year (%)	2nd year (%)	3rd year (%)	4th year (%)
Multi-modal	**VARK 1**	47 (31.5)	43 (29.7)	68 (41.5)	40 (39.2)
	VARK 2	15 (10.1)	27 (18.6)	19 (11.6)	12 (11.8)
	VARK 3	14 (9.4)	10 (6.9)	11 (6.7)	11 (10.8)
Uni-modal	**Visual**	46 (30.9)	48 (33.1)	41 (25.0)	27 (26.5)
	Auditory	5 (3.4)	4 (2.8)	4 (2.4)	2 (2.0)
	Read/write	4 (2.7)	2 (1.4)	3 (1.8)	1 (1.0)
	Kinesthetic	18 (12.1)	11 (7.5)	18 (11.0)	9 (8.8)
Total		149	145	164	102

V-Visual, A- Aural, R-Read/Write, K-Kinaesthetic, VARK 1- learners switch from mode to mode depending on what they are working with VARK 2- learners who gather information from each mode before acting, VARK transition (3) - learners who fall in between VARK type one & VARK type two

Table 4. Comparison of learning preferences according to academic performance (n=266)

		1st class (%)	2nd upper (%)	2nd lower (%)	Pass (%)
Multi-modal	**VARK 1**	8 (33.3)	19 (36.5)	20 (36.4)	61 (44.9)
	VARK 2	3 (12.5)	7 (13.5)	4 (7.3)	17 (12.5)
	VARK 3	1 (4.2)	6 (11.5)	4 (7.3)	11 (8.1)
Uni-modal	**Visual**	7 (29.2)	12 (23.1)	17 (30.9)	32 (23.7)
	Auditory	-	1 (1.9)	2 (3.6)	3 (2.2)
	Read/write	-	2 (3.8)	1(1.8)	1 (0.7)
	Kinesthetic	5 (20.8)	5(9.6)	7 (12.7)	10 (7.4)
Total		24	52	55	135

V-Visual, A- Aural, R-Read/Write, K-Kinaesthetic, VARK 1- learners switch from mode to mode depending on what they are working with VARK 2- learners who gather information from each mode before acting, VARK transition (3) - learners who fall

Learning preference and academic performance (n=266)

There was no statistically significant difference between academic performance and learning preference (Chi square 4.912; P =0.178).

High kinaesthetic preference among students achieving first class was noted in the absence of auditory and read/write preferences

Discussion

The administration of the VARK questionnaire in its original form, in English could be justified by the fact that it is a simple and easy to understand questionnaire used in its original form in several south Asian countries [9,10,11]. Furthermore, literature reveals that the validity and reliability of the VARK questionnaire have been recently established [12].

A majority of students preferred a multi-modal type of learning irrespective of gender, academic year and academic performance (Table 1). All of them were quad-modal learners, who preferred visual, auditory, and kinaesthetic and read/write learning modalities. This preference for multi-modal learning is congruent with the findings of many other studies done world-wide on medical and dental students [4, 6, 8, 13, 14, 15]. Some speculation is required as to why multi-modal learning is preferred by most medical students. It is possible that learners with a multi-modal preference have better academic outcomes than the general population, thus are selected to medical faculties and continue to carry on with their practiced learning method [16]. Furthermore, medical education is a process by which knowledge, skills and attitudes are inculcated in students requiring an efficient process which incorporates a combination of learning strategies which best suit the majority. [16]. In fact, multisensory learning has proven to be effective in memorizing and retaining and current data reveals that students only remember 20% of what they read, 30% of what they hear, 40% of what they see, 50% of what they say, and 60% of what they do and 90% of what they hear, see and do [17]. Especially in this study, multi-modal learners had a balanced preference for

all modalities of learning switching from mode to mode depending on what they are working on. It also appears that this preferred learning pattern becomes prominent over the course of study as they progress from the 1st year to 4th year (Table 3).

The study revealed that a significant proportion of learners also had a visual learning preference with a lesser preference for kinaesthetic, auditory and read/write preferences. Even though this contrasts with the literature where predominant preference among uni-modal learners was kinaesthetic, a study among dental students revealed a higher preference for visual learning than kinaesthetic learning [9, 15, 18, 19, 20]. The visual learning preference may be a result of prior exposure where the learning process in secondary educational institutes is predominantly of "board and chalk" type. It may be that this preference remains throughout the undergraduate period even though students are trained to engage in practice based teaching sessions like small group demonstrations, practical classes and discussions. VARK Visual is defined as "graphic" i.e. using charts, diagrams, maps, logos, designs, plans… not "pictures which can appear in power point presentation, you tube or any visual media" [5]. Therefore, since power point presentations do not cater to those who have a visual preference the fact that students develop a visual preference as a result of exposure to such presentations is false. A study on post graduate medical professionals revealed that as preferences are used more often they become more resistant to change and may require a significant event or long exposure before any substantial change occurred [21]. However the literature revealed that once the medical undergraduates started working as doctors where learning is predominantly self-based with more practicality their learning preference changed from auditory to kinaesthetic-an active learning strategy which enhances problem solving or decision making skills which is invaluable to medical professionals in managing patients [4,6].

Learning preference and gender

The current study revealed that there was no significant difference between males and females in their preference to learning (Table 2). The results were similar to the studies on medical undergraduates in United States and India, which revealed a multi-modal learning preference by both genders [11,16]. Even though not statistically significant our study demonstrates that a majority of males tend to be uni-modal while a majority of females are multi-modal. However, this result is not congruent with learning preferences of non-medical undergraduates where a male preference for a multi-modal style and a female preference for a uni-modal style were identified [24].

Learning preference and academic performance

Interestingly there was no statistically significant association between the learning preference and academic performance (Table 4). It appeared that there were equal proportions of both multi modal and uni-modal preferences among the high achievers. However it was interesting to note that none of the high performing students had a uni-modal preference of auditory or read/write while their kinaesthetic preference was high. Therefore the evidence revealed that no learning preference was superior to the other in terms of academic success. Similar studies conducted in Malaysia, Saudi Arabia and India using medical undergraduates has shown a non-significant relationship between preferred learning style and the academic performance [9, 10, 11]. However a study on entry nursing students has shown the kinaesthetic type of learning preference is a significant predictor of their learning

outcome [23]. It is clear that further studies are necessary to assess the academic performances of the students after the incorporation of teaching-learning instructions tailored specifically to the learning preference of individual student. This may not only improve student performance but may also motivate students [24].

Conclusions

Most medical undergraduates of the University of Peradeniya Sri Lanka preferred multi-modal (quad modal) and visual type of learning. There were no bi-modal or tri-modal learners. There was no significant relationship between gender and learning preference. Although there was no statistical significance in the learning preference based on academic seniority, there was a trend of becoming more multi-modal as they progressed to senior years. It appeared that there were equal proportions of both multi-modal and uni-modal preferences among the high achievers with an apparent kinaesthetic preference and absence of auditory and read/write preferences.

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