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Original research article

Differences in Learning Style Preferences Between Pre-clinical and Para-clinical Medical Students

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Abstract

Background: Presently medical education in India is going through a transitional phase. There is more stress on development of student-centered medical curriculum and teaching methodology. Therefore, it is imperative to understand how the medical students perceive, process, store, and recall the information which is imparted to them. The tools used to measure learning style are based on three major sensory modalities: visual (V), aural (A) and kinaesthetic (K), collectively known as VAK. a mixed sensory modality is added to these tools known as read-write (R)

Aim: To understand any gender preferences and variations in learning style among pre and para-clinical students in a medical college.

Method: The study was conducted on 203 healthy medical students from pre and para clinical phase. The pre-validate VARK questionnaire was used. VARK scores of males and female students were calculated and compared using Student's t test.

Result: Most students of pre and para clinical phases preferred multimodal learning style. The most preferred unimodal learning style varied in both genders.

Conclusion: The students should be divided into smaller groups according to their learning style preference or more variations in teaching should be brought out while designing instructions to cater a wider audience as per their preferred style.

Keywords: Learning style, learning preference, VARK questionnaire, medical student.

Introduction

Presently medical education in India is going through a transitional phase. There is more emphasis on development of student-centred medical curriculum and teaching methodology. Therefore, it is imperative to understand how the medical students perceive, process, store, and recall the information which is imparted to them. The compatibility between a students' learning style and the delivery of information must be conducive for proper understanding, processing and retaining information [1].

The tools used to measure learning styles are based on four major models: personality, information processing, social interaction and instructional preferences [2]. Within these broad models, many tests are available to determine learning style; like inventory of learning styles by Entwistle [3], Kolb Learning Style Inventory (LSI) [4], Learning Preferences Inventory (LPI) [5], Honey and Mumford Learning Style Questionnaire (LSQ) [6], Learning and Study Strategies Inventory (LASSI) [7] and the Learning Styles Profiler (LSP) [8], to name a few.

The method used in this study defines the preference in learning style based on the sensory modality in which a student prefers to take in new information. The three major sensory modalities are defined by the neural system that is preferred when receiving information: visual(V), aural(A) and kinaesthetic(K), collectively known as VAK. In other words, VAK categorizes student learning based on the sensory preference of the individual. This classification system was expanded by Fleming to VARK to include another category read-write (R, a mixed sensory modality) [9].
The present study aims to understand any gender preferences and variations in learning style among pre and para-clinical students in a medical college. All these information are essential to understand the students' learning preferences which finally aid in the adaptation of effective teaching methodology trying to cater to each and every student.

Material and Methods
The study was conducted in a Teaching Medical College and Hospital in Bangalore after getting approved by the Institutional Ethics Committee. Participation was voluntary and after obtaining informed consent. A total of 203 healthy medical students voluntarily participated in this study. We used the VARK (**V**isual, **A**ural, **R**ead/write, and Kinaesthetic) questionnaire after seeking a written permission from its developers to study the learning style among study subjects [9]. It consisted of 16 multiple choice questions each with 4 options. These four options for each question represented any of the four learning styles namely V, A, R, and K. The key was available to identify which options belonged to any of the four VARK categories. The questionnaire was administered to both pre-clinical and para-clinical students at the end of their respective classes on one occasion. The students took approximately 15 minutes to fill up the questionnaire. They were permitted to select single or multiple options based on their preference and no interaction with each other was allowed at the time of answering the questions.

Statistical Analysis: The first step was to determine the preferred VARK style among the study subjects. For this, all the selected options of the individual student from the list of 16 questions were categorised into four classes within the VARK framework and awarded one point each. Thus, total VARK and individual V, A, R, and K scores were available for every student. Next, we have to look at the predetermined stepping distance for different total VARK score categories (i.e. stepping distance of 1, 2, 3, and 4 for total VARK scores between 16-21, 22-27, 28-32, and >32 respectively) available from the VARK website. To obtain the learning modality for a student, we had to arrange their individual V, A, R, and K scores in descending order. Usually, the first preference is always the highest score. If the difference between the first two highest scores is larger than the stepping distance corresponding to their total score, the subject had a single preference. Otherwise, the student had two preferences. This continued down the order to determine the total no of preferences. Students were categorised as unimodal or multimodal, based on their preference for any one or more than one from the V, A, R, and K styles of learning derived as per the method mentioned above. Subsequently we summarised the results for all students as proportions with unimodal and multimodal preferences based on gender and year of training. The statistical analysis was done by software SPSS 21.0 version. VARK scores were expressed as percentage of total. Groups were compared by using 'z' sample test. P value is considered significance as < 0.05.

Results:
From pre-clinical phase 91% students and para-clinical phase 100% students returned the completed questionnaire. The study thus included 203 participants (Females, 112). Maximum participants were 18-19 y old (Table 1). Of these, 98 students were from pre-clinical (1st year)

and the rest 105 students were from para-clinical phase (2nd year). Among pre-clinical students, 44 were male and 54 were female students, while there were 47 male and 58 female para-clinical students in this study.

Table 2 shows preference of pre- and para clinical students while table 3 shows gender based preferences for VARK learning styles. Students in para-clinical curriculum were significantly more multimodal and less kinaesthetic (K) unimodality as compared to pre-clinical curriculum (Table 2), similarly most males were multimodal as compared to females and the aural (A) unimodality is significantly more in females as compared to males (Table 3).

Table 1: Age and Sex- wise distribution of study participants.

			Gender		Total
			F	M	
Age (yrs)	18	Count	59	41	100
		% Within Gender	52.7%	45.1%	49.3%
	19	Count	22	17	39
		% Within Gender	19.6%	18.7%	19.2%
	20	Count	17	19	36
		% Within Gender	15.2%	20.9%	17.7%
	21	Count	7	6	13
		% Within Gender	6.3%	6.6%	6.4%
	22	Count	6	6	12
		% Within Gender	5.4%	6.6%	5.9%
	23	Count	1	2	3
		% Within Gender	0.9%	2.2%	1.5%
Total	Count		112	91	203
	% Within Gender		100.0%	100.0%	100.0%

Table 2: VARK learning style among pre- and para- clinical students.

Mode of Preferences	Pre-clinical		Para-clinical		P value
	No	%	No	%	
No. Of Multi Modals	26	27	49	47	0.0032*
No. Of Visual Modality	21	21	20	19	0.7217
No. Of Aural Modality	4	4	11	10	0.0963
No. Of Read/Write Modality	13	13	8	8	0.2438
No. Of Kinaesthetic Modality	34	35	17	16	0.0018*
Total	98	100	105	100	

P value is considered significance as < 0.05

Table 3: VARK learning style among male and female students.

Mode of Preferences	Male		Female		P value
	No.	%	No.	%	
No. Of Multi Modals	40	44	35	31	0.0562
No. Of Visual Modality	20	22	21	19	0.5975
No. Of Aural Modality	2	2	13	12	0.0072*
No. Of Read/Write Modality	7	8	14	13	0.2529
No. Of Kinaesthetic Modality	22	24	29	26	0.7438
Total	91	100	112	100	

P value is considered significance as < 0.05.

Discussion:

The VARK questionnaire helps students to self-assess their learning style and improve learning by adopting different strategies. Similarly, if the teachers are aware of the preferred learning style of the students, they can plan their teaching methodology accordingly.

In the present study, 27% of students from preclinical phase were multimodal. Out of the rest, 35% were kinaesthetic learners, 21% visual and mere 4% of students preferred aural mode. This result is in consonance with other studies [10, 11]. On the other hand, more (47%) students in the para-clinical phase exhibited multimodality. Similar finding was observed among 2nd year students in another study done by Daud S et al [12]. When we compared between pre and para clinical medical students in mode of preferences of learning style, in case of multimodality, the students from the paraclinical students preferred more as compared to preclinical students which is significant [12] where as in unimodality the kinaesthetic (K) mode was significantly more in preclinical phase as compared to paraclinical curriculum. Surprisingly, a very few students chose aural mode from both pre and paraclinical curriculum. This result tells us, the students do not want to only listen in the lecture class. To better understand this, result further studies are required in medical students' population.

The question remains whether the students in later part of their training exhibit more and more high preference for multimodality or not. To answer this, ideally, we should be following up the same panel of students longitudinally and reassess their learning style at each stage. The present study cannot address this issue. However, we envisage the trend among different sets of students at each phase. It could be due to attaining maturity and understanding the perspective of the curriculum in a better way. We found that male students (44%) had higher preference as compared to females (31%) for multimodal learning style but not statistically significant. Male students may adjust to various types of teaching style in a flexible way to understand the concept [9, 13]. There are contradicted reports also using the same VARK questionnaire [14]. The percentages of male as well as female students were not of much difference in unimodal learning style except 'A'. The female students preferred aural (A) mode

significantly more as compared to males. This result also requires further study to understand this medical student's population learning styles.
Our result shows that the majority of students prefer a sort of combination of various teaching methodologies. Therefore, the educator can make strategies according to students' preferred mode of learning style in a given class so that both educators as well as students can achieve their goal.

The study has its own limitations. Firstly, we could not follow-up the change in learning style of the students till the end of their training. Secondly, we did not have sufficient sample size which would enable us to look at statistical differences based on gender.

Conclusion:
We strongly feel that it is imperative to understand how the medical students perceive, process, store and recall the information which is imparted to them. The students could be divided into smaller groups according to their learning style preference in an idealistic situation. However, it is not feasible practically. Therefore, more variations in teaching could be brought out while designing instructions to cater a wider audience as per their preferred style. This kind of study can be easily replicated in all the medical institutes to guide and enrich medical education technology. Further studies are required to validate the findings of the present study and compare with other tools to assess the learning styles.

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