

## RESEARCH ARTICLE

### Identification of learning styles in 1<sup>st</sup> year undergraduate MBBS students of a private medical school in western India

Anuradha Joshi<sup>1</sup>, Anusha Prabhakaran<sup>2</sup>, Jaishree Ganjiwale<sup>3</sup>, Devashish Palkar<sup>4</sup>

<sup>1</sup>Department of Pharmacology, Pramukhswami Medical College, Karamsad, Gujarat, India, <sup>2</sup>Department of Psychiatry, Pramukhswami Medical College, Karamsad, Gujarat, India, <sup>3</sup>Central Research Services, H. M. Patel Centre for Medical Care and Education, Charutar Arogya Mandal, Karamsad, Gujarat, India, <sup>4</sup>MBBS student, Pramukhswami Medical College, Karamsad, Gujarat, India

Correspondence to: Anuradha Joshi, E-mail: annuradhaj7@gmail.com

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#### ABSTRACT

**Background:** The challenge of imparting large amount of knowledge within a limited time period in a way it is perceived, retained, and effectively interpreted by students is considerable. This has resulted in crucial changes in the field of medical education with a shift from didactic, “teacher centered” to use of interactive, “student centered” learning. In context to this, knowledge of learning styles can be useful as it fosters student-centered learning. Knowledge on learners’ learning styles is a vastly underutilized approach in a medical classroom. **Aims and Objectives:** The current study was undertaken to identify the preferred learning styles of medical students. **Materials and Methods:** This was a descriptive, cross-sectional study. Permission from VARK developers, to use VARK Inventory Tool version 7.1 in the study was taken. Learning preferences were determined using VARK scores in the 1<sup>st</sup> year medical undergraduates. **Results:** Of the 89 who participated out of 100, 39.32% were male. Mean age of participants was 17.6 years. More than 80% students studied in state board, 10.11% were from CBSE, while 9.89% students were from ICSE and International Board, respectively. There was no association of gender with learning styles ( $P > 0.05$ ). The results showed that majority of students, i.e., 61.00% preferred multiple learning styles and the predominant learning style identified was kinesthetic (33%), followed by auditory (16%), then visual (14.6%), and lastly read-write (7.86%). **Conclusions:** There can be different types of learners in a batch. Educators’ awareness of various learning styles of students and their efforts toward designing “teaching-learning” methods according to learning styles of students may help in creating significant learning environment in classrooms.


**KEY WORDS:** Learning Styles; Teaching-learning Methods; Medical Students

#### INTRODUCTION

Learning style is defined as the composite of characteristic cognitive, affective, and physiological characters which serve as relatively stable indicators of how a learner perceives any

information.<sup>[1-3]</sup> It is thus an individual’s natural or habitual pattern of acquiring and processing information.<sup>[4]</sup>

Since, in today’s time, it is a challenge to impart large amount of new knowledge in a limited time frame in a manner which can be easily perceived, retained, and effectively interpreted by the students, it becomes imperative on the part of instructors to have awareness and knowledge of learning styles of students so as to facilitate the learning process. VARK questionnaire has been specifically designed to identify the learning styles as it can identify whether a student has a strong learning preference or whether the student is a “flexible” learner who can take in information from multiple

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methods. Students have different learning style preferences in the ways they take in and process the information, so the students who have a combination of learning preferences are multimodal, whereas those who prefer only one learning method have a single-mode preference. Students with a visual learning preference prefer to take in and give information holistically and often draw pictures and diagrams to explain concepts. Students with an aural learning preference prefer to listen and talk when learning. Students with a read-write learning preference prefer lists, handouts, and textbooks to understand new material while students with a kinesthetic learning prefer hands-on approach, including trial and error, real-life examples, and application of new material.<sup>[5]</sup>

The ability to identify students with a specific learning predilection allows educators to provide more individualized teaching approach. Furthermore, it can help in enhancing the student's performance specifically when instructions are adapted according to their learning preferences and styles. Since there are minimal published data on learning styles among undergraduates in medical colleges in western part of India, we decided to undertake this project to identify the learning styles of 1<sup>st</sup> year MBBS students in one of the medical colleges in western India.

**MATERIALS AND METHODS**

This was a cross-sectional observational study conducted on 100 students of 1<sup>st</sup> year, first semester MBBS students enrolled at Pramukhswami Medical College, Gujarat, India, during their foundation course. The duration of study was 6 months. The study was conducted after obtaining permission from the institutional ethics committee, written informed consent from participants and permission from the Dean of medical college.

VARK learning style inventory is one of the tools used to assess learning styles, developed by Dr. Neil D. Fleming.<sup>[6]</sup> VARK stands for an acronym for four major sensory modes of learning like: Visual "V," aural "A," reading/writing "R/W," and kinesthetic "K," depending on the neural system with which a learner prefers to receive information. VARK questionnaire consists of 14 multiple choice-questions with four possibilities to select an answer. All choices corresponded to four learning preferences, i.e., visual, aural, read/write, and kinesthetic. Students could select 1 or more choices for each question. Prior permission for using VARK questionnaire was taken from Dr. Neil D. Fleming, who holds the copyright for it. Validity and reliability of the VARK questionnaire have been recently established. Participants were given a brief introduction of the given project before data collection and were asked to fill in their roll numbers, age, gender, and board of studies in a separate form.

Following this, VARK Inventory tool version 7.1 was administered to students for determining their most preferred learning style. The completed questionnaire was collected after

15–20 min and learning style preferences were evaluated using the VARK score. Descriptive statistics were used to analyze the students' preferences of the various VARK components.

**RESULTS**

Mean age of participants was 17.6 years. Majority of students came from state board, i.e., 84.6%, 10.11% were from CBSE, while 9.89% students were from ICSE and International Board, respectively [Table 1].

Of 100 students, 89 participated. The batch comprised 39.32% males and 60.67% females. Analysis did not reveal any association of gender with learning styles: *P* > 0.05 [Table 2].

It was found that majority of students, i.e., around 61.00% exhibited multimodal learning style while the predominant learning style in this batch was kinesthetic (33%), followed by auditory (16%), then visual (14.6%), and lastly read-write (7.86%).

Predominant bimodal learning was as follows: VK 32.6%, VA 31.50%, AR 30.3%, and RK 27.0%, while in trimodal predominant learning style was as follows: ARK 13.5%, VAR 12.4%, and VRK 10.1%, and in quadrimodal, it was 3.40% [Tables 3 and 4].

**DISCUSSION**

The Indian undergraduate medical curriculum leading to the MBBS degree is of 5.5 years in duration. It comprises

**Table 1: Participants demographics age**

Parameters	Value
Age	Mean age: 17.6 years 17 years=37, 41.6% 18 years=47, 52.8% 19 years=3, 3.4% 20 years=2, 2.2%
Gender	Males (n=35, 39.32%) Females (n=54, 60.67%)
Board	Gujarat board=75, 84.26 CBSE board=9, 10.11, ICSE board=2, 2.80, IB board* =3, 2.89

\*International Board (British: n=1, Canada: n=1, America: n=1)

**Table 2: Distribution of VARK mode in male and female participants**

VARK mode	Mean (SD)		
	Male (n=35)	Female (n=54)	P value
Visual	4.48 (5.00)	4.37 (8.41)	0.934
Auditory	4.71 (5.65)	4.26 (7.07)	0.741
Read & Write	3.26 (5.93)	3.79 (9.36)	0.744
Kinesthetic	5.51 (6.04)	4.98 (9.92)	0.756

**Table 3:** Frequency of preferred learning style responses in each question

Questions	Visual learning style (%)	Auditory learning style (%)	Reading/writing learning style (%)	Kinesthetic learning style (%)
Question 1	20 (22.5)	54 (60.7)	13 (14.6)	21 (23.6)
Question 2	25 (28.1)	13 (14.6)	49 (55.1)	29 (32.6)
Question 3	39 (43.8)	20 (22.5)	12 (13.5)	44 (49.4)
Question 4	55 (61.8)	19 (21.3)	33 (37.1)	7 (7.9)
Question 5	20 (22.5)	17 (19.1)	10 (11.2)	58 (65.2)
Question 6	28 (31.5)	23 (25.8)	42 (47.2)	20 (22.5)
Question 7	38 (42.7)	35 (39.3)	14 (15.7)	20 (22.5)
Question 8	22 (24.7)	41 (46.1)	32 (36.0)	22 (24.7)
Question 9	37 (41.6)	30 (33.7)	24 (27.0)	23 (25.8)
Question 10	45 (50.6)	32 (36.0)	11 (12.4)	40 (44.9)
Question 11	16 (18.0)	22 (24.7)	8 (9.0)	57 (64.0)
Question 12	13 (14.6)	43 (48.3)	12 (13.5)	41 (46.1)
Question 13	28 (31.5)	15 (16.9)	11 (12.4)	56 (62.9)
Question 14	7 (7.9)	31 (34.8)	48 (53.9)	24 (27.0)

**Table 4:** Distribution of Bimodal VA, VK, Trimodal VAR, and Quadrimodal learning styles

Learning styles	n (%)
VA	28 (31.50)
VK	29 (32.6)
AR	27 (30.3)
RK	24 (27.0)
VRK	9 (10.1)
VAR	22 (12.4)
ARK	12 (13.5)
VARK	3 (3.40)

of four phases: First MBBS, Second MBBS, Third MBBS and Internship. This medical curriculum neither does have a mandatory module nor any provision of an elective module in identifying learning styles of medical students. As a result, curriculum has produced a generation of medical graduates who are ignorant about their preferred learning styles and therefore face difficulties in perceiving and retaining information in further studies.

On the other hand the educational world is gradually acknowledging the need of understanding the role of identifying different learning style preferences and their role in attaining academic success.<sup>[7]</sup> In the present study, majority of the students i.e. 61% exhibited multimodal learning style preferences, which indicated that they preferred multivariate modes of information or instructions. This finding matches with the studies conducted by Heidi L. Lujan and Stephen E. Di Carlo on first-year medical students which concluded that majority of the students (64%) preferred multiple modes of information presentation<sup>[8]</sup> A study conducted in India by Poonam Kharb *et al.*,<sup>[9]</sup> also reported that majority of students (61%) exhibit multimodal learning style preferences thus

indicating , preference for multiple modes of information. While another study conducted by Nuzhat *et al* states<sup>[10]</sup> that a very high percentage of students exhibited multimodal learning style i.e. about 72.6%. This implies that most of the students learn effectively as long as the teaching methods include a blend of activities that stimulate the visual, aural, read-write and the kinaesthetic sensory modalities. Increasing use of multimedia in teaching can provide opportunities for presenting multiple representations of the content (text, video, audio, images and interactive elements) to cater more effectively to the diverse learning styles of the students. Neuroscience research has also revealed that significant increases in learning can be accomplished when learning environments cater to their predominant learning styles.<sup>[11]</sup>

There are variations in the learning preferences of the medical students from different countries which could be related to the differences in the teaching methodologies being used at the premedical level and the exposure to the hands on clinical experiences in the first year of the medical curriculum. Our study shows that 61% participants preferred multiple learning styles , out of this the predominant bimodal learning was 32.6% for VK, 31.50% for VA, 30.3% for AR , 27.0% for RK, in Tri-modal learning style ARK was 13.5%, VAR 12.4% and in quadri-modal it was 3.40%. Most preferred mode in this batch of students was Kinaesthetic (33%), followed by Auditory (16%), then Visual (14.6%) and lastly Read-Write (7.86%). On extensive literature search we found that a study conducted by Baykan and Nacar<sup>[12]</sup> on first year medical students to assess their learning styles by using VARK questionnaire, states that 36.1% students preferred unimodal style and 63.9% preferred multimodal styles while no significant difference was found between gender in learning style preferences.

Another study conducted by Lujan and DiCarlo,<sup>[8]</sup> reported that the most preferred learning style of first year medical students was Read/Write among the students from Indiana, USA. On similar lines, Nuzhat *et al.*,<sup>[10]</sup> reported that the auditory mode was the most preferred learning style among the medical students from Saudi Arabia. However, some students prefer one of the modalities over the other three so strongly, that they struggle to understand the subject matter unless special care is taken to present it in their preference mode. To meet these needs, teachers of respective batches should first be aware of learning styles of their students which he or she is teaching. Subsequently care can be taken to provide and design teaching material which caters to multimodal learners. However, this can be possible to a greater extent, only if active teaching methods are used in classrooms.<sup>[13]</sup> Active learning plays an important role in encouraging critical thinking skills like evaluation, analysis, and information interpretation, as opposed to passive learning in form of traditional lectures, which mainly cater the needs of auditory learners.

The kinaesthetic learners prefer hands on approach to learning and therefore, the students with this learning style prefer to receive information best through role plays, simulations, use of models, debates, field trips, case studies, real-life examples, discussions and tutorials etc. With active learning strategies, visual learners are targeted by the presence of models and demonstrations, Auditory learners are reached through discussion during peer instruction, collaborative testing and debate.<sup>[14]</sup>

Unmatched learning styles and teaching-learning methodologies may adversely affect learning on the part of students<sup>[15,16]</sup> and therefore, tailoring instruction methods to students' learning style preferences is advocated. This goes in line with one of the study conducted by Stirling BV,<sup>[17]</sup> which reports that faculty were using teaching methods like kinaesthetic and visual as students' preferred the two learning styles as one of their most preferred method of learning. Correlating the students' learning style preferences and instructional needs can also provide personalized interventions because of the better match between teacher and learner. Providing training and opportunities to the medical educators to develop an understanding of the students' learning style preferences can result in a greater comprehension and consideration of the unique learning needs of each student who is under their tutelage. This is in line with one of the study conducted in Saudi Arabia findings which state that students would be benefitted if teachers understood the factors that can be related to students' learning styles.<sup>[18]</sup>

This holds true for clinical branches also e.g. in a study conducted by Kim RH *et al.*, states that there is a need for faculty to utilize novel surgical resident learning styles and a need to incorporate novel methods of teaching to convey

information in a more efficient manner as most general surgery residents have a multimodal learning preference.<sup>[19]</sup>

On the other hand, one of the major findings in the current study was it didn't reveal any association of gender with learning styles:  $p$  value  $>0.05$ , which is in line with a study conducted by Naqvi A. & Naqvi F.<sup>[20]</sup> The latter reports non-significant difference of learning style and gender in all groups. While on the contrary study conducted by Wehrwein EA, states that both male and female students have significantly different learning styles.<sup>[21]</sup>

### Limitations of the Study

This study has been conducted in only one batch of students. For this reason, these findings cannot be generalized to all the medical students. Second, like any other learning style inventory, VARK analyzes only one aspect of the learning style. In future, further studies need to be conducted to study if there are any correlations between the academic performance and learning styles of students, and also to explore whether learning styles of the students change as they progress from the preclinical phase to the clinical phase of the curriculum.

### Future Plan

The rationale for this descriptive study was to help students and at the same time enable the teachers design lesson plans which will actually help address the learning needs of students and to identify areas for further research. We intend to follow-up the same students in the 2<sup>nd</sup> year and 3<sup>rd</sup> year also and see whether there is any change in the predominant learning styles as they proceed higher.

### CONCLUSIONS

The present study aimed to address the diversity of learning styles amongst medical students. Identifying differences in learning styles could potentially be used in medical curricula so as to encourage diverse learning styles in entire batch especially low performers, slow learners or below average learners to perform better.<sup>[22]</sup>

Since there seems to be no single best teaching-learning strategy that can work for every student, it is responsibility of instructors to address this diversity of learning styles among students and develop appropriate learning approaches.<sup>[23]</sup>

Having knowledge on students learning styles is a vastly underutilized approach in medical classrooms. From our study, we understand, there can be different type of learners in a single batch of medical students, so educators' awareness of various learning styles of students is a must. Continuous efforts towards matching the teaching and learning styles can help in creating effective and significant learning environment for all the students.

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VARK developers for granting permission. Fleming N. VARK: a guide to learning styles 2007 [cited 2011 24 July 2011]; Available from: <http://www.varklearn.com/english/index.asp>.

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