

## RESEARCH ARTICLE

### A study on the learning styles and learning approaches among medical students

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#### ABSTRACT


**Background:** Designing of active learning strategies that promote self-directed learning, has been emphasized in the directives of undergraduate medical education by the Medical Council of India. Acknowledging the diverse learning styles and learning approaches of the medical students is often an underutilized approach to improve classroom instructions. **Aims and Objectives:** The present study aimed to study the percentage distribution of diverse learning styles and predominant learning approach among the medical students. **Materials and Methods:** Self-administered visual, auditory, read/write, kinesthetic questionnaire and Approaches and Study Skills Inventory for Students questionnaire were distributed to 121 medical undergraduate students, to assess their learning style and learning approach, respectively. **Results:** Of the total 121 students, 53.8% students were unimodal learners and 46.2% were multimodal learners. Among the unimodal learners, predominant were visual learners (24.1%). There was no significant influence of gender on the learning style preferences among the medical students. Deep approach was the predominant learning approach among the medical students. The mean scores of the strategic approach were significantly higher in females compared to the male medical students. **Conclusion:** A successful learning results only when the teaching and assessment methods are in alignment with the student's learning preferences. Students aware of their learning style and approach may be motivated to adopt techniques that best suit their learning styles and this may result in greater educational satisfaction.

**KEY WORDS:** Learning Style; Learning Approach; Medical Students

#### INTRODUCTION

A medical student is expected to be a "lifelong learner" committed to continuous improvement of skills and knowledge to cope up with the ever-evolving changes in the field of medicine.<sup>[1]</sup> Hence, a medical student's learning style and learning approach have major implications on their quality of learning and academic success.<sup>[2]</sup>

Learning styles and approaches to learning are fundamentally two different conceptions of learning. The term "learning style" refers to the learner's way to perceive, process, and retain the information, in terms of their sensory modality. One of the most widely known categorizations of the various types of learning styles are Fleming's visual, auditory, read/write, kinesthetic (VARK) model.<sup>[3-5]</sup> Learning approach can be defined as the behavioral and intellectual responses elicited by students as a result of exposure to a learning situation. A student with a deep approach to learning intends to understand the material. A surface approach involves investing a little time in the academic task and memorizing information with rote learning. Students adopting a strategic approach organize their work, manage time well, and aim specially to pass assessments. The mean score of the various approaches of all the students in a class provides a good

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index of the standard of the educational strategies adopted in the class.<sup>[6]</sup> A literature search reveals that deep and strategic approaches toward learning are more related with academic success.<sup>[7]</sup>

A student's learning process is influenced by various factors such as their intrinsic motivation, gender, learning environment, and educational background.<sup>[8,9]</sup> In Puducherry, for the past one decade, admission into the professional courses such as medicine was based on the total marks obtained in the terminal higher secondary examinations. Secondary education in schools is largely based on didactic lectures and deep rooted with rote learning strategies to achieve higher scores. Majority of the students are obsessed with the habit of simple factual recall, so their understanding on the subject remains fragmented and they lack critical thinking. Hence, these students on entering medical profession, find it difficult to cope up with the syllabus, which demands a deeper understanding of the subject and also its application at the appropriate context.<sup>[10]</sup>

The educational background of the students entering the medical profession imparts a heavy burden on the basic science medical teachers as they need to acknowledge the diverse learning style among the students and also design teaching strategies that motivate the students and improve their performance. Medical curriculum is highly challenging to both the students and teachers, as a large amount of information need to be imparted in a short period.<sup>[11]</sup> A successful learning results only when the teaching and assessment methods are in alignment with the student's learning preferences.<sup>[12]</sup>

Adoption of active learning strategies with encouragement of learner-centric approaches, self-directed learning, and competency-based learning has been emphasized in the directives of graduate medical education by the Medical Council of India (MCI).<sup>[1]</sup>

Hence, the present study aimed to assess the learning styles and learning approaches among the medical students admitted with an educational background, which is deep rooted with rote memorization. This may guide the teachers to devise active learning strategies congruent with learners' preferences that may influence better learning outcomes.

## MATERIALS AND METHODS

### Setting

The present cross-sectional study was carried out by the Department of Physiology of Sri Manakula Vinayagar Medical College and Hospital, Puducherry. It is a 10-year-old medical college admitting annually 150 students and is affiliated to the Pondicherry University of Government of India and regulated by the MCI. The teaching learning

methods adopted at the Department of Physiology in addition to traditional didactic lectures are small group teaching, seminars, peer-assisted learning, and model preparations. The formative and summative assessment comprises essay, short answer type in theory, and objective structured practical examination and performance in practical are used.

### Methodology

About 121 second year MBBS students comprising both males and females were recruited for the present study. Ethical clearance was obtained from the Institutional Ethics Committee. The informed consent was obtained from the participants after clearly explaining about the study. The tools used were VARK questionnaire version 7.8 for the assessment of learning styles and Approaches and Study Skills Inventory for Students (ASSIST) for the assessment of the predominant learning approach adopted by the student. VARK questionnaire was selected because of its simplicity, reliability, and for its extensive use in the research studies.<sup>[3-5]</sup> ASSIST questionnaire was selected as it provided accessible learning-related information which students could easily reflect on.<sup>[13]</sup> The principal of the institute was briefed about the study and the required permission was obtained. A self-administrated questionnaire comprising demographic details and the VARK and ASSIST questionnaire were distributed. Before administering the questionnaire, the first author briefed each item of the questionnaire to the participants. The questionnaire was administered during one community medicine lecture hour.

### VARK Questionnaire Version 7.8

Learning style preferences of the study participants were obtained using the VARK questionnaire version 7.8 (© Copyright version 7.8 (2014) held by VARK Learn Limited, Christchurch, New Zealand). The reliability scores for the visual, aural, read/write, and kinesthetic subscales were 0.85, 0.82, 0.84, and 0.77 from a previous study.<sup>[14]</sup> VARK is a self-administered questionnaire which comprises 16 questions with four options each. Respondents could choose more than one option for identifying the preferences for multiple learning styles. The study participants were classified as unimodal or multimodal learners depending on whether they predominantly used a single learning modality (V, A, R, or K) or a combination of these (VA, RK, VAR, VARK, etc.). Quadmodal learners were further classified into VARK type one (context specific), transition, and type two (context blind) categories.

### ASSIST

Learning approaches of the medical students were assessed using the ASSIST questionnaire. It is a self-report questionnaire, scored on a 5-point Likert-type scale with three sections. The reliability of the questionnaire used

in Indian study has been found to be 0.819.<sup>[15]</sup> It has three sections. Section A is a 6-item measurement of the student’s own conception of “What learning means to them?” Section B of the questionnaire had 52 items that identify the learner’s approach to studying (deep approach - 16 items, surface apathetic approach-16 items, and strategic approach with 20 items). The subscales scores were calculated for each approach according to the protocol. Section C included items on their preferences for different types of course and teaching.

**Data Analysis**

**VARK questionnaire**

The VARK questionnaire responses were entered into Excel spreadsheet and sent to the copyright holder of the questionnaire for further analysis. The designer of the questionnaire converted the responses into VARK categories based on VARK standard algorithm and VARK research algorithm. The results were mailed to the corresponding author. VARK research algorithm was used for further analysis of the results as it was found to have more statistical rationale.<sup>[16]</sup>

**ASSIST**

Only section B had been considered for statistical analysis in the present study. As the number of items varied between the three approaches, mean values from the raw scores, were considered for the statistical analysis.

**Statistical Analysis**

The results were imported to SPSS version 20 for further analysis. Descriptive statistics were used to calculate the percentage distribution of the students under each VARK category. Chi-square test was used to find any gender association between unimodal and multimodal learning preferences among the medical students. Mean values were calculated for three learning approaches among both the genders. Student’s *t*-test was used assess the gender differences in the learning approaches among the medical students. *P* < 0.05 was considered statistically significant.

**RESULTS**

A total of 121 students participated in the present study. Out of the 121 students, 55 (45.5%) students were male and 66 (54.5%) were female.

Table 1 reveals the percentage distribution of learning style preferences among the total study participants and its gender-wise comparison, as assessed by the VARK questionnaire. Of the total 121 students, 65 (53.8%) students were unimodal learners, 56 (46.2%) were multimodal learners with 4.1% being bimodal learners and 42.1% being quadmodal learners. Females were

predominantly visual learners, compared to males. Whereas, kinesthetic learners were more among males. However, there was no significant association with gender and learning style preferences (in terms of categorization into unimodal, bimodal, and quadmodal learners) ( $\chi^2 = 0.302, P > 0.05$ ).

Deep approach was found to be the predominant learning approach among the study participants (3.78 ± 0.50). The mean scores of the surface approach and strategic approach among the study participants were 3.43 ± 0.62, 3.65 ± 0.55, respectively.

Table 2 shows the gender-wise comparison of the mean scores of three types of learning approaches among the study participants. There was a significant difference in the strategic approach scores between the males and the females (*P* < 0.0001).

**DISCUSSION**

In the present study, various learning style preferences and the predominant learning approach were studied among the medical students. Majority of the students were unimodal learners and deep approach was the predominant learning approach adopted by the medical students.

**Table 1: Percentage distribution of learning styles among medical students and its gender-wise comparison**

Learning style	Total (%)	Males (%)	Females (%)	P value
Unimodal	53.8			0.860
Visual	24.1	8.3	15.8	
Auditory	17.5	8.3	9.5	
Read/write	1.67	1.67	-	
Kinesthetic	10.8	7.4	3.4	
Multimodal	46.2			
Bimodal				
VA	2.5	-	2.5	
AK	1.67	1.67	-	
Quad modal				
VARK type one	25.8	12.4	13.4	
VARK transition	13.2	3.3	9.9	
VARK type two	3.3	2.5	0.8	

Number of respondents, *n*=121,  $\chi^2=0.302, P>0.05$ , not significant, VARK: Visual, auditory, read/write, kinesthetic

**Table 2: Gender-wise comparison of the scores of learning approaches**

Categories	Males	Females	P value
Deep approach	3.69±0.45	3.86±0.53	0.078
Surface approach	3.40±0.53	3.46±0.68	0.637
Strategic approach	3.39±0.50	3.87±0.50	0.000*

Values expressed as mean±SD, \**P*<0.0001 - statistically significant

The VARK questionnaire was used to identify the learning style preferences among the medical students. The results revealed that majority (53.8%) of the medical students were unimodal learners, followed by quad modal learners (42.1%). To the surprise, there were no trimodal learners in our study population. Further, among the unimodal learners, predominant was visual learners (24.17%). Similar results were observed by other studies, with unimodal style of learning as the predominant style observed among the medical students.<sup>[17-19]</sup> However, the percentage distribution of the students among the different unimodal categories was different in these studies. Busan AM observed a majority of visual learners among the medical students.<sup>[17]</sup> A study on pre-clinical medical undergraduates observed that among the unimodal learners, a majority were of kinesthetic type.<sup>[18]</sup> In contrast, a study on medical students at Mashhad University reported auditory learning as the predominant unimodal learning style among the medical students.<sup>[19]</sup> These differences could be attributed to the different teaching styles adopted at the pre-medical level and also depend on the student psychology.<sup>[17]</sup>

As our study participants were predominantly visual learners, it is essential for the teachers to include more diagrams, charts, and graphs in their PowerPoint presentations, in addition to the routine didactic lectures. In addition, teaching aids such as flip charts, overhead projectors, and videos may also be effectively utilized in the teaching hours to enhance their learning. Active learning strategies such as learning with models and demonstrations may be targeted toward the visual learners.<sup>[20]</sup> The majority of the study participants being visual learners, the teacher's body language and facial expressions do play an important role in the learning process. In our study, 17.5% of the medical students were auditory learners, who may be benefited by the traditional didactic lectures. Further, addition of oral instructions to the visual presentations may facilitate their learning process. Innovative active learning strategies such as group discussion with peer, debates may be introduced for aural learners.<sup>[21,22]</sup> Kinesthetic learners formed the third major group among the unimodal learners in our study. This could be attributed to the fact that medical education involves teaching a large number of practical skills. Preparation of models, hands-on training, and role plays may be introduced to facilitate the learning process of kinesthetic learners.<sup>[23]</sup>

Literature search revealed some studies which have recorded multimodal learning as the predominant learning style among the medical students in contrast to the results of our study.<sup>[24-26]</sup> This disparity could be attributed to the VARK research scoring algorithm adopted by our study for the categorization of learning styles, which was found to have more statistical rationale, compared to the VARK standard algorithm.<sup>[16]</sup> Yet, a significant proportion of our students were still multimodal learners, who preferred to use all the four sensory modalities (quad modal). The majority of

these quad modal learners were of VARK type one, who are context specific and adopt the learning style that best suits the situation. Hence, the teaching methods should include a blend of activities that stimulate all the four sensory modalities.<sup>[24]</sup> Thus, a teacher must provide a blend of activities that is multisensory, at the same time need to take care of the unimodal learners. Active learning strategies, in contrast to the traditional didactic lectures may benefit all type of learners.<sup>[25]</sup> It may be suggested that students may be divided into small groups based on their mode of learning and active learning strategies may be adopted in small groups with the teaching aids tailored to the students' preferences, this may facilitate a better learning process. Yet it requires more time, background preparation and faculty involvement to engage multiple groups.

Analysis of the gender differences in our study revealed the fact that majority of the females were visual learners, whereas males were predominantly kinesthetic learners. Similar results were observed by a study from Iran, with males being predominant kinesthetic learners.<sup>[27]</sup> However, statistical test does not reveal a significant influence of gender on the learning style preferences. Similar results were observed by other studies.<sup>[28,29]</sup> Gender has been found to produce a major influence on learning style preferences, as observed by an Indian study<sup>[24]</sup> and another study from Saudi Arabia.<sup>[30]</sup> These disparities could be due to the difference in the sample size compared to other studies.

ASSIST questionnaire was used to study the learning approach among the medical students. Deep approach was the predominant approach of learning adopted by our medical students. Despite an educational background deep rooted with rote memorization, our students have adopted deep approach as the predominant learning approach. This reflects the inherent capacity of the individuals, which could be further strengthened by adopting learning strategies that are congruent to their expectations. Similar results were observed by other studies, where they observed that compared to other professional courses, medical students adopt the deep-learning approach.<sup>[31,32]</sup> The curriculum, assessment methods, and feedback influence the level of deep approach to learning among the medical students. Few studies have observed surface approach<sup>[33]</sup> and strategic approach<sup>[13]</sup> to be the predominant learning approach among the medical students. Differences in the pre-medical educational strategies, differences in the sample size, the academic year of the study participants, and the study tools used might have contributed to these dissimilarities. It has also been observed that medical students adopt a deep approach toward learning at the beginning of the academic year but gradually shift to surface learning in the last 2 years of their course.<sup>[31,32]</sup> More longitudinal studies with large sample size need to come up to study the influence of medical curriculum on the learning methodologies of the students over a 5-year period.

Analysis of the gender differences in the learning approaches among the medical students showed that females predominantly adopt a strategic approach of learning compared to the male medical students which was statistically significant. Similar results were observed by other studies.<sup>[34,35]</sup> The influence of gender on the learning capabilities is a never ending debate. Females tend to organize their study with the assessment demands and males always go for a logical reasoning and search for evidence supporting their understanding.<sup>[34]</sup> It has also been observed that deep and strategic approaches to learning are associated with high-academic performance.<sup>[36,37]</sup> The mean score of the various approaches of all the students in a class provides a good index of the standard of the educational strategies adopted in the class.<sup>[6]</sup>

This study stands different from other studies as it had tried to analyze both the learning style and learning approach of the undergraduate medical students. The learning style adopted by the students will be intimated to them through a counseling session, which may facilitate their learning process. Further, the educators will also be made aware of the results of this study, which may help them to plan the teaching strategies in alignment with the learners' expectations.

Our study has certain limitations. It was only a cross-sectional study, with a small sample size and the sample was restricted to second year medical students only. We did not attempt to correlate the learning styles and approaches with the academic performance. A longitudinal study on a large sample size, involving all grades of medical undergraduates and postgraduates may be more helpful in planning or revising the teaching strategies and the assessment methods.

## CONCLUSION

A medical student is expected to be a "lifelong learner" and his/her learning style and learning approach have major implications on their quality of learning and academic success. An effective teacher is expected to have knowledge of the learning preferences of their students, apart from their content knowledge and pedagogical knowledge. Narrower the gap between the teacher intention and learner interpretation, enhanced are the opportunities to achieve the desired learning outcomes.

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