



A CROSS - SECTIONAL QUESTIONNAIRE BASED STUDY ON LEARNING STYLES AMONG UNDERGRADUATE MEDICAL STUDENTS

Dr. R Anusha Rebecca*

*MBBS, MD (Forensic Medicine & Toxicology), Assistant Professor, Department of Forensic Medicine & Toxicology, Saveetha Medical College & Hospital, Saveetha Institute of Medical & Technical Sciences (SIMATS), Chennai.

Email: anusha181193rebecca@gmail.com

ABSTRACT

Background: Medical education demands rapid adaptation to complex curricula, making the understanding of individual learning styles crucial for optimizing student performance. The VARK model (Visual, Aural, Read/Write, Kinesthetic) provides a framework to assess these preferences, yet studies on medical undergraduates remain limited. This study aimed to identify the preferred sensory modalities for learning and explore potential differences across gender and academic years.

Methods: A cross-sectional study was conducted among third- and final-year medical students using the pre-validated VARK questionnaire (Version 8.0). The questionnaire assessed preferences for unimodal (single style) or multimodal (combined styles) learning. Data were analyzed to determine associations between learning styles, gender, and year of study using chi-square tests. (SPSS version 20.0, $p < 0.05$ considered significant).

Results: Among 200 participants, 86% preferred multimodal learning, with bimodal combinations (e.g., RA [18%], VA [16%], AK [13.5%]) being most common. Unimodal learners (14%) predominantly favoured the kinaesthetic style (6%). No significant associations were found between learning preferences and gender ($p = 0.08$) or year of study ($p = 0.3$). However, final-year students showed a preference for RA and VA bimodal styles, while third-year students favoured AK ($p = 0.0007$).

Conclusion: Most medical students exhibited multimodal learning preferences, underscoring the need for diverse teaching strategies that integrate visual, auditory, read/write, and kinaesthetic elements. These findings advocate for curriculum reforms aligned with the National Medical Commission's competency-based approach, emphasizing adaptable methodologies to enhance engagement and academic outcomes. Future research should investigate longitudinal trends and the impact of tailored interventions on clinical skill acquisition.

Keywords: Learning Styles, VARK Model, Medical Education, Multimodal Learning, Curriculum Design.

INTRODUCTION

Medical education poses significant challenges for students transitioning from school to a demanding curriculum, requiring rapid adaptation to new subjects and study methods (1). Understanding individual learning styles defined as the unique ways students perceive, process, and retain information is essential for optimizing education. These styles are influenced by cognitive preferences, personality, and environment, and tailoring teaching methods to them enhances learning efficiency (2). The VARK model (Visual, Aural, Read/Write, Kinaesthetic), developed by Neil Fleming, provides a practical framework for assessing these preferences.

Visual learners thrive with diagrams and charts, aural learners through discussions and lectures, read/write learners with textbooks and notes, and kinaesthetic learners via hands-on activities (3). Multimodal learners, who combine styles, further highlight the need for flexible teaching approaches (4).

Recognizing learning styles is critical for several reasons. First, it personalizes the learning experience, reducing cognitive overload and helping students grasp complex medical concepts more effectively (5). For instance, visual aids like flowcharts benefit visual learners, while kinaesthetic learners excel in lab settings. Second, alignment between teaching methods and learning preferences boosts engagement and motivation, whereas mismatches can lead to frustration (5). Third, studies show that accommodating learning styles improves academic performance; auditory learners, for example, perform better when allowed to discuss topics, while read/write learners succeed with structured note-taking. Beyond catering to dominant styles, educators can strengthen non-preferred modalities,



www.ajmrhs.com
eISSN: 2583-7761

Date of Received: 15-03-2026
Date Acceptance: 22-03-2026
Date of Publication: 25-04-2026

fostering adaptability a crucial skill in medical practice (4,5).

The implications extend to curriculum design. Traditional lecture-based methods, still prevalent in many institutions, often fail to address diverse styles. Active strategies, such as problem-based learning, which incorporate multiple modalities, are increasingly favoured (6). Research, such as that from King Saud University, highlights how cultural and educational backgrounds influence preferences; in teacher-centred systems, many students tend to favour auditory learning (7). Tools like VARK, with their simplicity and reliability, empower educators to create inclusive classrooms and refine teaching strategies (7).

Objectives:

1. To understand the preferred sensory modality of students for learning
2. To ascertain whether any preference in learning style exists between different student groups and gender wise

METHODOLOGY

This cross-sectional, questionnaire-based study was meticulously conducted over a six-month period, from March to August 2022, primarily at Saveetha Medical College & Hospital in Chennai. Ethical approval for the study protocol was secured from the Institutional Ethics Committee (IEC) of the Institutional Review Board (IRB).

A total of 300 medical students, comprising 150 students from both the second and third-year MBBS batches, were invited to participate. Of these, 200 students, representing a 67% participation rate (100 students from each respective batch), provided their informed consent and were enrolled in the study. Data collection was facilitated using the VARK questionnaire Version 8.0, administered via Google Forms. Following data acquisition, all completed questionnaires were meticulously entered into a data sheet. The collected data subsequently underwent rigorous statistical analysis, primarily employing descriptive statistics to accurately summarize demographic information and the frequencies of participant responses.

RESULTS

In our study, 31.5% (63) of students were aged 21 years, and 29% were aged 20 years, with 52.5% being females. (Figure 1, Figure 2) Among the study, majority (86%) preferred multimodal learning modality. (Table 1) This pattern was similar on sub-group analysis, wherein 84% of third year students and 89% of final year students preferred multimodal method of learning. (Table 3) This pattern sustained when analysis was done according to gender, and 90.5% of girls and 82% of boys favoured multimodal method of learning. (Table 3) There was no statistically significant association between year of study and the preferred modality of learning (Chi-

square=1.07, p-value=0.3). Similarly, no significant association was observed between gender and preferred modality of learning (Chi-square=2.99, p-value=0.08). (Table 3)

Among those who preferred the unimodal learning technique (n=27), majority preferred the Kinesthetic style of learning (n=12). (Table 2) Among the third years and the final years, the most preferred unimodal technique was observed to be kinesthetic (n=6 each) followed by visual (third year, n=6; final year, n=2) and auditory (third year, n=4; final year, n=2). (Table 4) None of the participants in the third year preferred the reading unimodal learning style, whereas only 1 participant from the final year preferred reading as a learning style. It was observed that men preferred the unimodal learning style more compared to women. (Men, n=17; Women, n=10) (Table 5) Neither of the two, year of study (Chi-square=1.88, p-value=0.4). And gender (Chi-square=0.047, p-value=0.98). Was observed to be significantly associated with type of unimodal learning style. (Table 4 and 5)

Among those who preferred the multimodal learning style, they were subclassified into bimodal (76%), trimodal (8.5%) and multimodal (1.5%) learning preferences. Among those who preferred bimodal learning style, RA was the most preferred (18%), followed by VA (16%) and AK (13.5%). Similarly, among those who preferred the trimodal style, most of the preferred VRK (3.5%), followed by KVA (3%) and KAR (2%). (Table 2) On sub-group analysis based on year of study and gender, we observed a significant association between year of study and preferred bimodal learning style. (Chi-square=11.401, p-value=0.0007), indicating that final year students preferred the RA and VA modalities, whereas the third year students preferred the AK modality better. (Table 4 and 5)

DISCUSSION

We conducted this study among the third and fourth year medical undergraduate students to assess their individual learning styles using the VARK questionnaire. This pre-validated VARK 16-item questionnaire not only suggests the preferences of individual learners based on sensory stimuli but also provides the learning strategies which should be adapted according to the learning style of the participants. Thus, knowledge of this background data about the learning styles of the students allows a facilitator to modify accordingly, his or her teaching-learning methods and thus optimising the learning experiences of the students. Furthermore, the learner after getting a clue about the style of learning he/she possesses, redesigns the learning strategies for better academic outcome.

In this study, most of the students preferred multimodal learning style (84%), in particular the bimodal modality [RA (18%), VA (16%) and AK (13.5%)]. Among those who preferred unimodal

modality, Kinaesthetic was the most preferred (6%), followed by visual modality (4%) and auditory (3%). Only 1 student in our study preferred reading as a learning style.

In a similar study conducted among 1st year students in Raipur, India, 3/4th of the participants preferred the multimodal learning style, whereas only 1/4th preferred the unimodal learning style. In line with our study, the most preferred unimodal method was Kinaesthetic. Among those who preferred multimodal technique, the most common types were VARK, AK and VAK. (4)

Similarly, in a study by Kharb P et al. (8), 61% had multimodal VARK preferences. Among them, 41%, 14% and 6% preferred the bimodal, trimodal and the quadrimodal ways of information presentation. 39% of the respondents had one strong (unimodal) learning preference. The most common unimodal preference was kinaesthetic, followed by visual, auditory and read and write. Among those with multimodal, VA, VK and AK were the most preferred styles.

In a study by Alfarsi W et al., a total of 292 students from year 1 to final year were enrolled and most of the students had preference for the multimodal style of teaching (54%), mostly bimodal (30%). This was followed by the kinaesthetic mode of learning (30%) in the unimodal style. The MD1 and MD6 students had preference for the unimodal style whereas the other years (MD2, MD3, MD4) had preference for the bimodal style. (5)

In a study by Sirisha A et al., only 8% of the participants preferred unimodal style of learning, whereas 28% preferred the bimodal method, and 32% each preferred trimodal and quad modal styles. (9)

In our study, a significant association was found between the year of study and the preferred type of bimodal learning style. Specifically, final-year students preferred the RA and VA modalities, whereas third-year students preferred the AK modality more (Chi-square=11.401, p-value=0.0007).

Like my study, Muniyapillai T et al., observed a significant association between year of study and the preferred learning style (p-value <0.001), with no significant association between gender and preferred style of learning. (10) This was in-line with the study by Sirisha A et al., wherein no significant association was observed between gender and the preferred learning style. (9)

The National Medical Commission introduced a new curriculum in 2019 in which different types of teaching-learning methods were recommended to emphasise that each style of learner acquires the instructions in his preferential style.

The present study conducted with the aim to decipher the learning styles of the learners has definite implications on the teaching-learning instructions methodologies which should ideally be

adapted and best suited to the audience. The study came up with the finding that most of the learners had multimodal preferences, and thus, teaching-learning methods must cater to all the learners. For example, while teaching a topic, one can use a mind map for visual learner, provide notes to read/write learners, repeat and reemphasise the key points and concepts or to use podcast for aural learners and make a good use of models and specimen in Demonstration - Observation- Assistance - Performance (DOAP) sessions for kinaesthetic learners.

CONCLUSION

This study underscores the importance of recognizing diverse learning styles among medical students, with the majority (86%) exhibiting a preference for multimodal learning approaches, particularly bimodal combinations like RA and VA. The results advocate for a paradigm shift from traditional lecture-based methods to dynamic, inclusive teaching practices that integrate visual, auditory, read/write, and kinaesthetic elements. By tailoring instruction to multimodal preferences such as combining diagrams, discussions, hands-on activities, and structured notes, educators can enhance engagement, reduce cognitive overload, and improve academic outcomes. Furthermore, the study highlights the need for institutional alignment with the National Medical Commission's competency-based curriculum, which emphasizes adaptable teaching-learning methodologies.

Ultimately, fostering an environment that acknowledges and accommodates diverse learning styles not only optimizes individual student performance but also cultivates the adaptability essential for future medical professionals. Future research should explore longitudinal trends in learning preferences and the impact of tailored interventions on long-term retention and clinical skill acquisition.

REFERENCES

1. Neelopant SA, Sura T, Devakar S. Learning preferences among undergraduate medical students. *Int J Med Sci Public Health* 2016;5:986-8.
2. Hattie, J., O'Leary, T. Learning Styles, Preferences, or Strategies? An Explanation for the Resurgence of Styles Across Many Meta-analyses. *Educ Psychol Rev* 37, 31 (2025).
3. Fleming N. Teaching and Learning Styles Vark Strategies. Christchurch, New Zealand: 2001
4. Dhurandar D, Chandrakar T, Chandrakar D, Agrawal J. A survey of learning styles of undergraduate medical students and its associated factors. *J Med Evid*. 2023; 4 (3): 231-4.

5. Alfarsi W, Elaghoury AH, Kore SE. Preferred Learning Styles and Teaching Methods Among Medical Students: A Cross-Sectional Study. *Cureus*. 2023;15(10):e46875.
6. Bhalli MA, Khan IA, Sattar A. Learning Style of Medical Students and its Correlation with Preferred Teaching Methodologies and Academic Achievement. *J Ayub Med Coll Abbottabad*. 2015;27(4):837-42.
7. Almigbal TH. Relationship between the learning style preferences of medical students and academic achievement. *Saudi Med J*. 2015 Mar;36(3):349-55.
8. Kharb P, Samanta PP, Jindal M, Singh V. The learning styles and the preferred teaching-learning strategies of first year medical students. *J Clin Diagn Res*. 2013;7(6):1089-92.
9. Sirisha A, Mubarak G, Lavanya D, Bhagyalakshmi VS, Lakshmi MS. Gender differences in learning styles in undergraduate medical students using VARK questionnaire. *European Journal of Cardiovascular Medicine*. 2025; 15 (3): 722-7.
10. Muniyapillai T, Kulothungan K, Malik SRA, Jeevaraj SJ, Ashokan S, Ravichandran S, et al. Learning styles and their relationship with preferred teaching methodologies and academic achievement among medical students in teaching medical college, Tamil Nadu. *Journal of Education and Health Promotion [Internet]*. 2023 Jul 1;12(1).

How to cite this article: Dr. R Anusha Rebecca, A CROSS - SECTIONAL QUESTIONNAIRE BASED STUDY ON LEARNING STYLES AMONG UNDERGRADUATE MEDICAL STUDENTS, *Asian J. Med. Res. Health Sci.*, 2026; 4 (1):1346-1351.

Source of Support: Nil, Conflicts of Interest: None declared.

Table 1. Types of Learning Modalities

Variable	n (%)
Unimodal	27 (14%)
Bimodal	153 (76%)
Trimodal	17 (8.5%)
Multimodal	3 (1.5%)

Table 2. Distribution of Participants According To Individual Learning Styles

Variable	n (%)
Visual	8 (4%)
Auditory	6 (3%)
Reading and writing	1 (1%)
Kinaesthetic	12 (6%)
KV	21 (10.5%)
VR	17 (8%)
AK	13.5%
RA	36 (18%)
VA	32 (16%)
VRK	7 (3.5%)
KVA	6 (3%)
KAR	4 (2%)
VARK	3 (1.5%)

Table 3: Association between Year of Study, Gender and Preferred Mode of Learning

Year of study	Unimodal	Multimodal	Chi-square	p-value
Third year	16 (16%)	84 (84%)	1.07	0.3
Final year	11 (11%)	89 (89%)		
Gender				
Male	17 (18%)	78 (82%)	2.99	0.08
Female	10 (9.5%)	95 (90.5%)		

Table 4. Association between Year of Study, And Preferred Unimodal And Multimodal Mode Of Learning

Preferred unimodal style	Third year	Final year	Chi-square value	p-value
Visual	6 (75%)	2 (25%)	1.88	0.4
Auditory	4 (66.7%)	2 (33.3%)		
Reading and writing	0 (0)	1 (100%)		
Kinesthetic	6 (50%)	6 (50%)		
KV	14 (66.7)	7 (33.3)	11.401	0.0007
VR	9 (52.9)	8 (47.1)		
AK	14 (51.9)	13 (48.1)		
KR	12 (60)	8 (40)		
RA	13 (36.1)	23 (63.9)		
VA	9 (28.1)	23 (71.9)		
VRK	2 (28.6)	5 (71.4)	4.57	0.1
KVA	5 (83.3)	1 (16.7)		
KAR	3 (75)	1 (25)		
VARK	3 (100)	0 (0)	-	-

Table 5. Association between Gender, and Preferred Unimodal and Multimodal Mode of Learning

Preferred unimodal style	Male	Female	Chi-square value	p-value
Visual	5 (62.5)	3 (37.5%)	0.047	0.98
Auditory	4 (66.7)	2 (33.3%)		
Reading and writing	1 (100)	0 (0)		
Kinesthetic	7 (58.3)	5 (41.7%)		
KV	13 (50)	13 (50)	1.19	0.275
VR	8 (44.4)	10 (55.6)		
AK	16 (53.3)	14 (46.7)		
KR	8 (40)	12 (60)		
RA	14 (43.8)	18 (56.2)		
VA	13 (44.8)	16 (55.2)		
VRK	2 (40)	3 (60)	2.5	0.11
KVA	1 (20)	4 (80)		
KAR	0 (0)	5 (100)		
VARK	3 (100)	0 (0)	-	-

Table 6. Association between Gender, And Preferred Mode of Learning

Preference	Male(n)	Female(n)	Total(n)	Percentage (%)	Chi-square value	p value
Bimodal						
KV	13	13	26	13%	1.19	0.275
VR	8	10	18	9%		
AK	16	14	30	15%		
KR	8	12	20	10%		
RA	14	18	32	16%		
VA	13	16	29	14%		
Total(n)	72	83	155	77%		
Trimodal						
VRK	2	3	5	2.50%	2.5	0.11
KVA	1	4	5	2.50%		
KAR	0	5	5	2.50%		
Total(n)	3	12	15	7.50%		
Multimodal						
VARK	3	0	3	1.50%	-	-
Total(n)	3	0	3	1.50%		
Total(n)	78	95	173	86%		

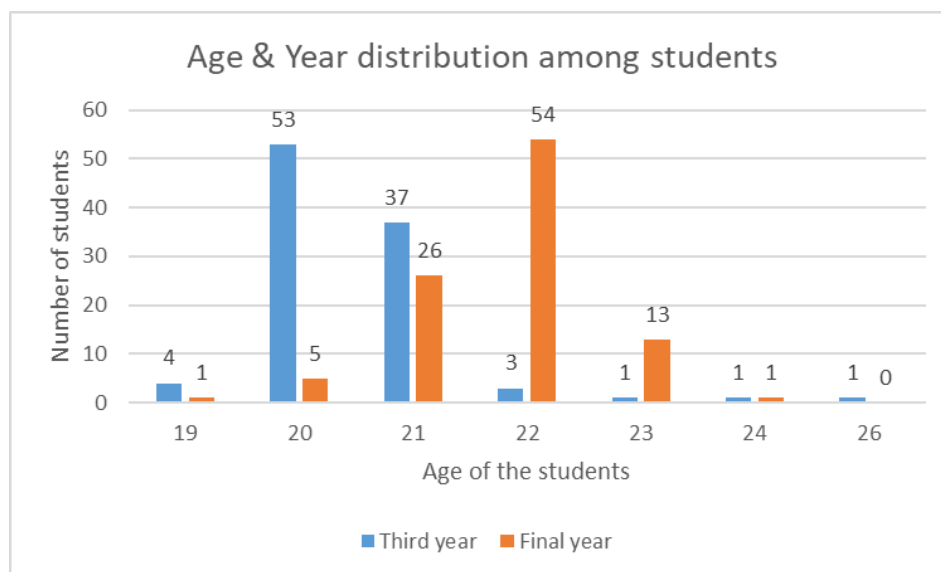


Figure 1. Age & Year Distribution among Students

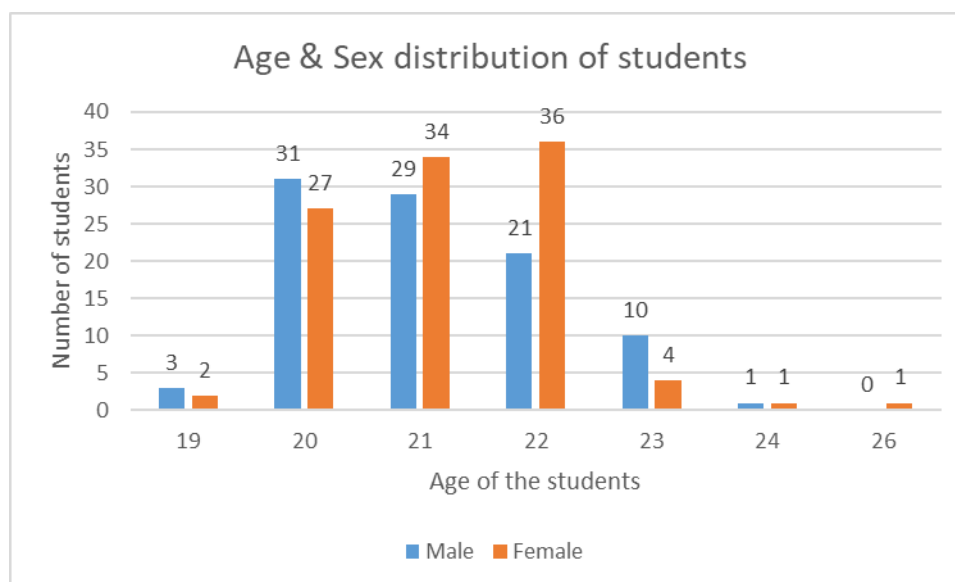


Figure 2. Age & Sex Distribution among Students