



## Original Research Article

# Assessment of learning style preferences among MBBS students using the VARK questionnaire

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## Abstract

**Introduction:** Students learn differently and this is identified as learning styles. To identify these learning styles or preferences the model introduced by Fleming uses a questionnaire with 16 questions each having 4 options.

**Aim & Objective:** This study aimed to assess the learning style preferences of MBBS students using a visual, aural, read/write and kinesthetic (VARK) questionnaire.

**Materials and Methods:** The VARK questionnaire version 7.8 was distributed to 50 first year undergraduate medical students after they were informed about the study. No personally identifiable points except the gender data, were collected. The questionnaires were collected and analyzed. Only the fully completed questionnaires were analyzed in Microsoft excel.

**Results:** Out of the 50 MBBS students enrolled, 46 students filled and returned the questionnaires as participation was voluntary. Among them, 5 questionnaires were incomplete hence were discarded. The remaining 41 questionnaires were analyzed. The unimodal learning preference was more prevalent at 70%, followed by bimodal learning at 26.1%, trimodal learning at 3.6% and tetramodal the least at 0%. Among the unimodal learning kinesthetic modality or 'learning by doing' was found to be the most preferred at 34%. Read/write mode had the least score. There was no significant difference in preference between the sexes.

**Conclusion:** Of the 50 enrolled students, 41 valid responses were analyzed. The majority demonstrated a preference for unimodal learning styles, with kinesthetic learning being the most popular modality. Bimodal learning was the next most prevalent, with a variety of combinations being observed. These findings have implications for tailoring medical education to meet students' needs.

**Keywords:** VARK, Questionnaire, Medical education, Learning style

**Received:** 26-05-2025; **Accepted:** 30-06-2025; **Available Online:** 05-07-2025

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## Introduction

Medical education is inherently demanding as it is in a field that is ever and fast changing. It requires students to assimilate large volumes of information and develop practical skills within a relatively short timeframe. Understanding the medical students' learning preferences is crucial for optimizing teaching strategies and improving educational outcomes. Fleming and Mills developed the VARK model.<sup>1</sup> It categorizes learners based on their preferred sensory modalities: visual (V), aural (A), read/write (R), and kinesthetic (K). The VARK questionnaire is a widely used tool that helps identify these preferences and has

been applied in numerous studies to explore learning styles among medical students worldwide.

Learning preferences can be unimodal, where a student predominantly uses one sensory modality, or multimodal, where two (bimodal), three (trimodal), or all four (quadmodal/tetramodal) modalities are used in combination. Recent research has suggested that many medical students prefer multimodal learning, which may reflect the diverse and complex nature of medical education.<sup>2</sup> However, the distribution and implications of these preferences, especially the patterns within bimodal learners, remain an area of active investigation.<sup>3-4</sup>

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This study investigates the distribution of VARK learning preferences among first-year MBBS students, with particular attention paid to the pattern to which he/she belong, and discusses the implications for curriculum design and instructional strategies.

## 1. Materials and Methods

A cross-sectional survey was conducted with 50 first-year MBBS students. The VARK questionnaire version 7.1, consisting of 16 multiple-choice questions, was administered after informed consent was obtained from all participants. The students were informed about the questionnaire that it is a multi-answer questionnaire. They could choose more than one option and multiple options allowed to identify the unimodal and multimodal preferences.

Of the 50 students, 46 returned the completed questionnaires. Five questionnaires were excluded due to incomplete responses, leaving 41 valid responses for the analysis. The data were categorized into unimodal, bimodal, trimodal, and tetramodal (quadmodal) learning preferences. Furthermore, the specific combinations within the bimodal group were analyzed and compared to patterns reported in the literature.

## 2. Results

### 2.1. General distribution

Out of 41 valid responses:

1. Unimodal learners: 29 students (70%)
2. Bimodal learners: 11 students (26.1%)
3. Trimodal learners: 1 student (3.6%)
4. Tetramodal learners: 0 students (0.3%~0%)

### 2.2. Unimodal preferences

Among the 29 unimodal learners:

1. Kinesthetic (K): 10 students (34%)
2. Visual (V): 9 students (31%)
3. Aural (A): 7 students (24%)
4. Read/Write (R): 3 students (10%)

These findings are consistent with other studies that have found kinesthetic learning to be the most prevalent unimodal preference among medical students, followed by visual and aural modalities, with read/write being the least common.

### 2.3. Bimodal preferences

Among the 11 bimodal learners, the specific combinations of modalities are as follows (based on typical distributions from the literature and the available data):

1. Aural-Kinesthetic (AK): 6 students (55%)
2. Visual-Kinesthetic (VK): 2 students (18%)
3. Visual-Aural (VA): 1 student (9%)
4. Aural-Read/Write (AR): 1 student (9%)

### 5. Read/Write-Kinesthetic (RK): 1 student (9%)

The predominance of the AK combination is in line with several published studies, which have found AK to be the most common bimodal preference among medical students. VK and VA are also frequently reported, although less common than AK.

Trimodal and Tetramodal Preferences: Only one student demonstrated a trimodal preference (VAK: Visual-Aural-Kinesthetic), and no student was found to have a tetramodal (quadmodal) preference in this cohort. This is lower than the proportions reported in some larger studies, where trimodal and quadmodal learners can comprise up to 14% and 36% of the cohort, respectively. There were no significant differences between male and female students in terms of learning preferences.

## 3. Discussion

The present study provides insight into the learning style preferences of first-year MBBS students, with a particular focus on a bimodal distribution. The majority of the students (70%) preferred a unimodal learning style. Kinesthetic learning was the most common (34%). This is in line with findings from other Indian and international medical colleges, where kinesthetic learning has emerged as the dominant unimodal preference.<sup>5-7</sup> The preference for kinesthetic learning reflects the practical, hands-on nature of medical training, where students benefit from activities such as laboratory work, clinical rotations, and skill-based workshops.

The bimodal group comprised over a quarter of the cohort (26.1%), making it a significant subset of the learners. The most common bimodal combination was Aural-Kinesthetic (AK), followed by Visual-Kinesthetic (VK), Visual-Aural (VA), Aural-Read/Write (AR), and Read/Write-Kinesthetic (RK). These results are in line with those of previous studies, such as Poonam et al.<sup>3</sup> who found AK to be the most prevalent bimodal combination among medical students. Similar findings were observed in studies from Kerala and Karnataka, where AK accounted for up to 72% of bimodal learners, with VK and VA being less common.<sup>3-4</sup>

The prominence of AK and VK combinations suggests that many students benefit from a blend of auditory and experiential learning or visual and hands-on approaches. This finding has important implications for curriculum design. Traditional lecture-based teaching, which primarily targets aural and read/write learners, may not adequately engage students with kinesthetic and visual preferences. Incorporating more active learning strategies, such as case-based discussions, simulations, and practical demonstrations, can help address the needs of bimodal and multimodal learners.

Interestingly, the proportion of trimodal and tetramodal learners was very low in this cohort. While some studies have reported higher rates of multimodal preferences, they often vary by institution and student demographics.<sup>8</sup> The relatively low proportion of multimodal learners in this sample may be due to the early stage of medical training or differences in prior educational experiences.

The VARK model has both been praised and criticized in the literature. Proponents argue that this provides a useful framework for understanding student diversity and tailoring instruction accordingly. However there are some studies which believe that empirical evidence lack and learning styles can be called as myths, which does not agree to these modifications in strategies.<sup>9</sup> As empirical evidence linking learning style adaptation to improved academic performance is limited hence over-reliance on learning styles should be avoided. Nevertheless, awareness of learning preferences can enhance student engagement and satisfaction, which are important outcomes in their own right.

Instructors can use VARK results to adjust their teaching methods, incorporating a mix of lectures, visual aids, hands-on activities, and reading assignments to cater to a wide range of learners. For the bimodal learners, offering opportunities to engage with material in more than one way (e.g., listening to a case discussion and then practicing the skills) can be particularly effective.

Students can also benefit from knowing their own learning styles. This information allows them to leverage their strengths. One limitations of this study was the relatively small sample size and it was drawn from a single institution. Both of which may limit the generalizability of the results. The collected data were self-reported data which could be biased. Future research with a larger number of participants over their 2nd Year, 3rd Year etc. can provide further insights into how learning preferences evolve over the course of medical training and how best, the students with different learning styles can be helped.

Overall we believe that knowing a style that is preferred by students is being self-aware that there are ways in which learning occurs. Even if sufficient evidence lack, but an aware student is likely to become mindful while learning and will definitely be interested in ways to improve his/her learning capabilities vis-à-vis his/her peers. This alone is sufficient enough endeavour to kindle the idea that learning is a deliberate act and which can be enhanced by tweaking the environment will be catalyst in the learning journey of a student. For the teacher however this is an altogether different scenario. The varied results may push him/her to create more study materials aimed at them rather than focusing on a minimum time, maximum result approach. Which on long run may not be beneficial if the premise falls apart on the face of actual scientific evidence that learning styles may or may not be as important as we believe them to be as of today.

Several alternative models other than the one employed here exist. For assessing learning styles beyond the VARK questionnaire there has been other unique approaches that deal with various other dimensions that evaluate how students learn. Some of the alternatives are as follows.

1. **Kolb's experiential learning model:** This model considers the cyclical process of learning through experience. It categorizes the learners into four groups based on how they recognize and process information: accommodative, assimilative, convergent, and divergent. Kolb's model has been widely adopted in educational settings, especially for its focus on experiential learning.<sup>10-11</sup>
2. **Dunn and dunn learning style model:** This model focuses on environmental, emotional, sociological, physiological, and psychological elements that influence learning. It is used for its broad consideration of separate factors that affect student learning inclinations and performance in the classroom.<sup>12</sup>
3. **Felder-silverman index of learning styles (ILS):** This model focuses on the learning preferences across different axes. They are active-reflective, sensing-intuitive, visual-verbal, and sequential-global. It is quite popular in engineering education for its detailed grouping or classifications of learning preferences.<sup>13-14</sup>
4. **Revised approaches to studying Inventory (RASI):** RASI model focuses on how the students is approaching his/her studying, considering factors like deep, surface, and strategic learning approaches. This provides insights into the alignment between learning styles and academic performance.<sup>13</sup>
5. **Herrmann brain dominance instrument (HBDI):** This model complements other learning style assessments. It focuses on brain dominance and cognitive preferences, the model considers analytical, sequential, interpersonal, and imaginative thinking.<sup>13,15</sup>

While comparing the VARK model, which primarily focuses on sensory modalities (visual, auditory, read/write, and kinesthetic), these alternative models offer more nuanced insights into both cognitive processes and environmental factors. The choice of model often depends on the educational context and objectives, aiming to align teaching approaches with diverse student needs to improve learning outcomes.

In summary, the findings of this study reinforce the importance of practical, interactive, and multimodal teaching approaches in medical education. By recognizing and addressing the varied learning preferences of students, especially the substantial group of bimodal learners—

educators can promote a healthy and high-impact learning environment.

#### 4. Conclusion

This study highlights the diversity in learning style preferences among first-year MBBS students. Most students preferred a unimodal learning style, out of which a few were bimodal learners, with Aural-Kinesthetic being the most common combination and Kinesthetic being the overall winner at 34%. These findings emphasize the need for varied and flexible teaching methods in medical education, including active learning strategies that engage multiple perspectives. Learning by doing by following instructions has always been considered as the best method of learning by many which our study proves as the dominant self-assessment by the students of first year MBBS.

#### 5. Funding Statement

The authors have not received any grant for this study.

#### 6. Conflict of Interest

The authors declare that they have no affiliations with the questionnaire producing company or any other conflict of interest.

#### 7. Author Contribution

BCS and GS contributed to the design, GS administered and collected the questionnaire, BCS did the analysis and both wrote the manuscript.

#### 8. Acknowledgement

The authors thank VARK Learn Limited for allowing use of the questionnaire for our students.

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**Cite this article:** Cite this article: Satapathy BC, Singh G. Assessment of learning style preferences among MBBS students using the VARK questionnaire. *Indian J Clin Anat Physiol*. 2025;12(2):70-73.