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Original Research Article

Identification of learning style preferences among first year MBBS students using VARK questionnaire

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ABSTRACT

Background: Learning style refers to the preference of the students for receiving and processing the information. In the present CBME curriculum, as the learning is more student-centric, understanding the learning style preferences of the students allows higher educational efficiency. Learning styles can be assessed by different models. Among them, the VARK model is more concise, simple, appropriate, and reliable. VARK categorizes learning by sensory preferences – Visual, Auditory, Read/Write, and Kinesthetic.

Aim & Objectives: To identify the mode of learning and learning style preferences among first-year MBBS students using the VARK questionnaire and to determine the relationship between learning style preferences and gender.

Materials and Methods: This cross-sectional study was carried out among first-year MBBS students at AIIMS, Guwahati for 6 months after obtaining permission from the Institutional Ethics Committee. Consenting students were administered with a Google form of VARK questionnaire version 7.8. Descriptive statistics were used to analyze the student's preference for various VARK components. The chi-square test was used to compare four VARK learning styles between male and female students.

Results: 97 students (75 males and 22 females) studying first-year MBBS participated in the study. Most of the students were tetra-modal learners (38.14%) showing a preference for all four sensory modalities. 31 students (31.95%) showed an unimodal mode of learning. This is followed by trimodal (17.52%) and bimodal (12.37%) learners showing a preference for three and two sensory modalities respectively. The most preferred learning style was kinesthetic (mean score was 10 ± 3.58) and the least was read/write (mean score was 4.79 ± 3.48).

Conclusion: Knowledge of the learning style may allow the students to improve their academic performance. It helps the instructors to modify and adopt appropriate teaching methods addressing different learning styles for achieving higher educational efficiency.

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1. Introduction

Medical students have different educational backgrounds and have a diverse range of learning experiences. Over the years, the students would have developed their preference

for learning in receiving and processing the information. In the present CBME curriculum, as the learning is more student-centric, understanding the learning style preferences of the students allows higher educational efficiency. Teaching-learning is a process of knowledge presentation and it is an activity meant for students to change their behaviour. To provide a more conducive environment for the learners, most educational institutions are trying to develop

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an instructional design that suits the learning style of the learner.

Keefe defined the learning style as characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment.¹ Past experiences and social environment play an important role in determining the learning style of an individual.² The preference of learning style may change over time and with the situation. Learners acquire and process the information in various ways – seeing and hearing, reflection and action, thinking, analysis, and perception. To assess the learning styles there are different models available – Kolb’s Learning Styles Inventory,³ VARK model,⁴ and Honey and Mumford learning style theories.² These models are based on different learning theories, principles of learning, and psychological constructs. Among these, the VARK model is concise, simple, appropriate, and reliable.

VARK learning style model is modified from the VAK model to the VARK model by Fleming in 2006.⁴ VARK categorizes learning by sensory preferences. VARK is an acronym for the Visual (V), Auditory (A), Read/Write (R) and Kinaesthetic (K) sensory modalities. It is a learning inventory grouped under the ‘instructional preference’ model. For better information processing the visual learners learn better when the study material is presented as graphs, pictures, diagrams, and handouts; the auditory learners hear information through lectures, discussions, and tapes, the read-write learners by text-book reading and notes writing and; kinaesthetic learners learn by doing experiments, dissections, case history taking and clinical examination. Students may learn the information by single sensory preference (unimodal), two sensory preferences (bimodal), three sensory preferences (trimodal), or four sensory preferences (quadrmodal).⁵

While acquiring knowledge, medical students experience a different learning environment in the preclinical and clinical phases. Various studies have been done on learning style preferences^{6–9} and the results are highly variable implying the diversity of learning among medical students. There is minimal published data on learning styles and approaches among the medical undergraduates in North East India.

2. Aim and Objectives

1. To identify the mode of learning and learning style preferences among first-year MBBS students using the VARK questionnaire.
2. To determine the relationship between learning style preferences and gender.

3. Materials and Methods

This cross-sectional study was carried out among first-year MBBS students at AIIMS, Guwahati for 6 months after obtaining permission from the Institutional Ethics Committee (Ref. No. AIIMSG/IEC/M1/S1/2023 dated 20th February 2023). Students without consent are excluded from the study.

3.1. Sample size

Based on the review of the literature of the study done by Khan et al.,⁹ the prevalence of Kinesthetic learning was 20.04% and with the limit of accuracy as 5% of the anticipated prevalence, confidence interval at 90% the Z alpha value of 1.64, the sample size was calculated as (n=94).

3.2. Study tool

A self-administered structured VARK questionnaire version 7.8 was used. The students were asked to fill out the Google form consisting of 16 questions with 4 options each. Students can choose more than one option for each question to identify their learning styles so that a minimum score of 16 and a maximum score of 64 could be obtained from each of the respondents. The purpose of each question is to identify the preferred learning styles. If the student preferred only one of the four VARK learning styles, then he/she was categorized to have an ‘unimodal’ mode of learning and if more than one style was preferred, then it was labeled as ‘multimodal’. The multimodal category was further subdivided into bimodal, trimodal, and tetra-modal learning modes if the respondent preferred two, three, and all four VARK learning styles, respectively.

3.3. Data collection

Consent was obtained from the students participating in the study. After briefly explaining the purpose of the study, a questionnaire was distributed. The students were asked to fill in the demographic data and then to give their options for each question. Confidentiality was maintained throughout the study. The responses in the questionnaires were assessed according to the information in the VARK guide.

3.4. Statistical analysis

Data was analyzed by SPSS, version 20. Descriptive statistics were used to analyze the student’s preference for various VARK components. The chi-square test was used to compare the preferred learning styles among male and female students. ANOVA was used to compare the mean scores of individual VARK components. Independent t-test was used to compare the mean score of individual VARK components among males and females.

4. Results

A total of 97 students participated in the study, out of which 75 (77.3%) were males and 22 (22.7%) were females. Male: Female ratio is 3.4:1.

The modes of learning among the first-year MBBS students were tabulated in Table 1.

Table 1: Mode of learning among the first year MBBS students

| Mode of learning | Males (n=75) | Females (n=22) | Total (n=97) | p value |
|------------------|--------------|----------------|--------------|---------|
| Unimodal | 25 (33.33%) | 06 (27.27%) | 31 (31.95%) | 0.0006* |
| Bimodal | 06 (8%) | 06 (27.27%) | 12 (12.37%) | 1.000* |
| Trimodal | 14 (18.66%) | 03 (13.63%) | 17 (17.52%) | 0.007* |
| Tetra modal | 30 (40%) | 07 (9.33%) | 37 (38.14%) | 0.0001* |

Chi-square test was used. Data expressed in percentage. *p value < 0.05 statistically significant

Table 2: Preferred learning styles among the first year MBBS students

| Mode of learning | Learning style | Total |
|--------------------|-----------------|-------------|
| Unimodal (n=31) | Visual (V) | 04 (12.9%) |
| | Auditory (A) | 03 (9.67%) |
| | Read/Write (R) | 01 (3.22%) |
| | Kinesthetic (K) | 23 (74.19%) |
| Bimodal (n=12) | VK | 03 (25%) |
| | AK | 07 (58.33%) |
| | RK | 02 (16.66%) |
| Trimodal (n=17) | VAK | 15 (88.23%) |
| | VRK | 01 (5.88%) |
| | VAR | 01 (5.88%) |
| Tetra modal (n=37) | VARK | 37 (38.14%) |

In the present study, 31 students (31.95%) showed an unimodal learning preference. Among the unimodal group, 23 (74.19%) were kinesthetic learners, followed by 4 (12.9%) were visual learners, 3 (9.67%) were auditory learners and 1 (3.22%) was read/write learner. 66 (68.04%) students preferred more than one sensory modality for learning. Most of the students were tetra-modal learners (38.14%), followed by trimodal (17.52%) and bimodal (12.37%). The preferred combinations of learning styles (sensory modalities among bimodal and trimodal groups were tabulated in Table 2.

Gender differences in the preference of learning styles among unimodal, bimodal, trimodal, and tetra-modal groups were tabulated in Table 3.

Mean VARK scores for individual sensory modalities of learning are shown in Table 4. The mean score is higher for kinesthetic modality and least for the read/write modality. The mean scores of individual VARK components among

males and females are shown in Table 5.

5. Discussion

In the present study, the VARK questionnaire was administered to the first-year MBBS students to assess their learning styles. Students from different regions of India with different cultural backgrounds are enrolled in this institute. 68.04% of students are multi-modal learners showing a preference for more than one sensory modality for learning. Among the multimodal group, 38.14% of students preferred a tetra-modal mode of learning, followed by trimodal (17.52%) and bimodal (12.37%). 31.95% of students are unimodal learners. Among the unimodal learners, the most preferred sensory modality was kinesthetic (74.19%), followed by visual (12.9%), auditory (9.67%), and read/write (3.22%). A comparison of the mode of learning in various studies is shown in Table 6.

Mode of learning varies in different studies because of the different cultural and environmental backgrounds, characteristics of the students, method of teaching, and method of assessments. However, in most of the studies, the students have a multimodal learning approach. So, students get the benefit of teaching methods including a blend of activities to stimulate the visual, aural, read-write, and kinaesthetic sensory modalities. Learning style is not related to intelligence or inherent skills but it is related to how we acquire and understand information.¹⁶ It can be used for acquiring knowledge, positive skills, and attitude. The increasing use of technology and artificial intelligence in teaching can provide an opportunity for addressing the diverse learning styles of the students (text, video, audio, images, and interactive elements). In the present study, most of the males are tetra modal and unimodal learners and most of the females are unimodal and bimodal learners. There is a significant difference in the mode of learning between males and females. But considering the small sample no generalizations can be made regarding the influence of sex.

In the present medical curriculum, there is increasing demand for multimodal learning, as the teaching methods are changing from didactic learning to discussion, self-directed learning, and problem-based learning, with more focus on practical and reduced lecture time.¹⁹

In the present study, the most preferred learning style is kinesthetic, followed by auditory, visual, and read/write. The same preference was observed when males and females were compared. There is a strong relationship between learning style preferences and academic achievement.¹⁷ Styles of learning are as important as intellectual ability and ignoring it will put learning in jeopardy. Medical students' awareness is an important factor in improving the medical education quality; if the method of information delivery to them conforms to their learning style, they will learn better.¹⁴ Teachers can develop effective pedagogical strategies if they know the learning preferences of the

Table 3: Preferred learning styles among the males and females

| Mode of learning | Sensory modality | Males | Females | p value |
|-------------------|------------------|-------------|-------------|---------|
| Unimodal (n=31) | Visual | 03 (12%) | 01 (16.66%) | 0.3 |
| | Auditory | 03 (12%) | 00 | 0.08 |
| | Read/Write | 01 (4%) | 00 | 0.9 |
| | Kinesthetic | 18 (72%) | 05 (83.33%) | 0.006* |
| Bimodal (n=12) | VK | 02 (33.33%) | 01 (16.66%) | 0.5 |
| | AK | 03 (50%) | 04 (66.66%) | 0.7 |
| | RK | 01 (16.66%) | 01 (16.66%) | 1.0 |
| Trimodal (n=17) | VAK | 12 (85.71%) | 03 (100%) | 0.02* |
| | VRK | 01 (7.14%) | 00 | 0.9 |
| | VAR | 01 (7.14%) | 00 | 0.9 |
| Tetramodal (n=37) | VARK | 30 (40%) | 07 (9.33%) | 0.0001* |

Chi-square test was used. Data expressed in percentage. *p value < 0.05 statistically significant

Table 4: Mean scores of individual VARK components

| Learning style | Visual | Auditory | Read/Write | Kinesthetic | p value |
|----------------|------------------------|------------|------------------------|----------------------|---------|
| mean ± SD | 7.16±3.44 [§] | 7.82±3.74* | 4.79±3.48 [#] | 10±3.58 [@] | 0.001* |

[§]visual compared with other VARK components, *Auditory compared with other VARK components, [#]read/ write compared with other VARK components, [@]kinaesthetic compared with other VARK components. ANOVA was used. *p value < 0.05 statistically significant.

Table 5: Mean scores of individual VARK components among males and females

| Learning style | Males | Females | p value |
|----------------|-----------|------------|---------|
| Visual | 6.98±3.23 | 7.77±4.02 | 0.174 |
| Auditory | 7.38±3.44 | 9.31±4.29 | 0.052* |
| Read/Write | 4.45±3.03 | 5.95±4.51 | 0.61 |
| Kinesthetic | 9.66±3.50 | 11.13±3.64 | 0.042* |

Data expressed in mean±SD. Independent t test was used. *p value < 0.05 statistically significant

Table 6: Mode of learning reported in various studies

| Study | Place | Mode of learning | | | |
|--------------------------------------|-----------------------|---|---------|----------------|-------------|
| | | Unimodal | Bimodal | Trimodal | Tetra modal |
| Mani et al ¹⁰ 2021 | Kerala, India | 57.3% V-18.3%; A-10.9%; R-26.9%; K-43.9% | 4.2% | 0.6% | 37.7% |
| Kharb et al ¹¹ 2013 | Uttar Pradesh, India | 39% V-7%; A-4%; R-2%; K-26% | 41% | 14% | 6% |
| Soundariya, et al ¹² 2017 | Puducherry, India | 53.8% V-24.1%; A-17.5%; R-1.67%; K-10.8% | 4.1% | - | 42.1% |
| Ojeh N et al ¹³ 2017 | Barbados, West Indies | 40.1% | 14% | 9.6% | 36.3% |
| Bokhari et al ¹⁴ 2019 | Sialkot, Pakistan | 41% | 53% | 5% | 1% |
| Gayathri et al ⁸ 2016 | Tamil Nādu, India | 48% V-19%; A-34%; R-12%; K-35% | 24% | 17% | 11% |
| Lujan et al ¹⁷ 2006 | Detroit, Michigan | 36.1% V-5.4%; A-4.8%; R-7.8%; K-18.1% | 24.5% | 32.1% 63.8% | 43.1% |
| Nuzhat et al ¹⁸ 2011 | Saudi Arabia | 37.4% V-5.5%; A-11.8%; R-2.1%; K-8.1% | 39.4% | 42.5% 72.6% | 22.6% |
| Alfarsi et al ¹⁵ 2023 | Sohar, Oman | 46.2% V-5.1%; A-6.8%; R-3.8%; K-30.5% | 31.2% | 16.4% | 6.2% |
| Urval et al ¹⁶ 2014 | Mangalore, Karnataka | 31.3% V-5.4%; A-45.5%; R-16.2%; K-33.1% | 18.1% | 14% | 36.6% |

students.

6. Limitations

One of the limitations of this study was the relatively small sample size, particularly the low number of female students. This study includes only first-year MBBS students. A larger sample size may help to identify the regional and gender-based differences.

7. Conclusion

Using the VARK questionnaire, the present study shows that most students were tetra-modal learners and the most preferred learning style is kinesthetic. Though a significant difference is seen in the mode of learning between males and females, the results cannot be generalized. Awareness of the learning styles is important in improving the quality of teaching, the ability to learn, and enhancing education. It helps educators deal with learning problems encountered by the students, thus helping them learn more effectively and achieve academic success. Adaptation of teaching methods by the instructors to address different learning style preferences, can motivate the students and improve their performance.

8. Source of Funding

None.

9. Conflict of Interest

None.

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