ORIGINAL ARTICLE

LEARNING STYLE PREFERENCES OF FIRST YEAR UNDERGRADUATE MEDICAL STUDENTS

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ABSTRACT: BACKGROUND: Students have different preferences in the way they receive and process information. The VARK learning style model classifies students into four different learning modes; visual (V), aural (A), read/write (R), and kinesthetic (K). This model includes a questionnaire that identifies a person's learning preference. **MATERIALS AND METHODS:** VARK questionnaire version 7.3, having 16 multiple choice questions, was distributed to first year undergraduate medical students who gave consent. **RESULTS:** Majority of students (60.2%) were multimodal in their learning preference. Among the multimodal students, the commonest learning preference was the bimodal category (64%), of which the highest number was seen in the AK category (24 students). The highest unimodal preference was auditory (57% of unimodal learners). There were no visual unimodal learners. The most common trimodal preferences were ARK and VAK. The total individual scores in each category were V-326, A-635, R/W-393, and K-629; auditory having the highest preference followed by kinesthetic mode. Visual mode had the lowest overall score. There was no significant difference in learning preference between the sexes. **CONCLUSION:** Different students have different learning styles. The teachers should use combination of teaching strategies to cater to all types of learners.
KEYWORDS: Learning preferences, learning styles, VARK.

INTRODUCTION: Students entering the medical college face difficulty because of extensive syllabus and limited time period. These students differ in their age, experience, cultural background, level of preparedness and preferred learning styles. Teaching to such a diverse group is difficult as there is increased pressure of finishing the syllabus within the limited time. As the teaching is mostly didactic lecture, it fails to cater to all the students.

A learning style or preference is the complex manner and conditions under which, learners most efficiently and effectively understand, process, store, and recall what they are attempting to learn. Learning style inventories are information-processing models that aim to identify a student's preferred intellectual approach in assimilating and processing information[1]. There are many models to identify the learning styles of students. Some of these are Felder-Silverman learning and teaching styles model, Dunn & Dunn model, Kolb Learning Style Inventory and VARK questionnaire.

VARK questionnaire[2] is a simple, freely available, easy to administer tool that encourages students to describe their learning behavior.[3] The acronym VARK stands for Visual, Aural, Read/write, and Kinesthetic. These are the sensory modalities that are used for learning by students. Visual (V) learners learn through seeing maps, diagrams, charts, graphs, symbols, flow charts etc. Auditory (A) learners learn from lectures, group discussions, and talking things

ORIGINAL ARTICLE

through. Reading/writing (R) learners learn by reading textbooks, manuals, essays etc. Kinesthetic (K) learners learn best by use of experience and practice (demonstrations, simulations, videos and movies of real things etc.). The students can be unimodal preferring one mode of learning or multimodal having preference for more than one mode of learning.

The aim of the present study was to find out the preferred learning style of first year undergraduate medical students using the VARK questionnaire and compare the learning preferences between sexes as different studies have shown different results among sex.[4, 5, 6]

MATERIAL AND METHODS: The study protocol was approved by the Institutional Review Board. One hundred first year undergraduate medical students were asked to take part in the study. They were briefed about the study and written informed consent was obtained.

VARK questionnaire version 7.3 was used after permissions were obtained. The VARK questionnaire with instructions can be obtained free of charge.

[http: //www.vark-learn.com/documents/The%20VARK%20Questionnaire.pdf]

The students can also assess their VARK score online by answering the questions

[http: //www.vark-learn.com/english/page.asp?p=questionnaire]

Printed version of the questionnaire was given to students and they were asked to return it back in 15 minutes. Demographic data (age and sex) was also collected.

The VARK questionnaire consists of 16 questions with 4 options for each. The questions describe situations of common occurrence in daily life, thereby relating to an individual's learning experience. Each option correlates to a particular sensory modality preference. Hence, the modality that received the highest marks was the preferred sensory modality. Since students were free to select more than one option, multiple modalities of varying combinations could be obtained. Students were instructed to choose the answer that best explained their preference and circle the letter(s) next to it. They could choose more than one option or leave blank any question that they felt was not applicable to them. Questionnaires were evaluated on the basis of previously validated scoring instructions and a chart.[2] Since each of the answers represents a sensory modality preference, the same was calculated for an individual participant by adding up the responses for all 16 questions.

Statistical analysis was done using SPSS 17. Chi-square test was used to analyze difference between the sexes. Statistical significance was set at $P < 0.05$. Percentage of students in each category was determined with Microsoft Excel 2007. Excel 2007 was also used to draw charts and table.

RESULTS: 91 out of 100 students consented and participated in the study. Out of these, 68 students (73%) were female. The mean age of participants was 19.0 (± 0.94) years. 56 students (60.2%) preferred more than one sensory modality for learning (Multimodal) and only 37 students (39.8%) were unimodal. [Figure 1]
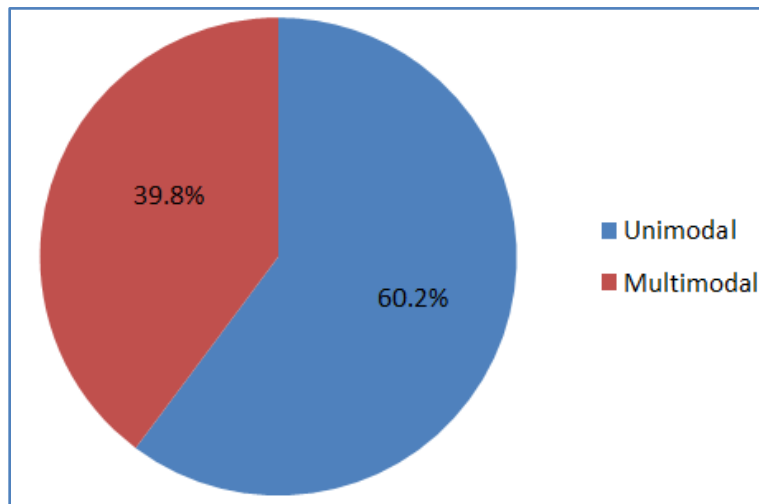
Fig. 1: Preference for unimodal and multimodal learning

Of the 56 students who preferred multiple modes of information presentation, most students preferred two modes (bimodal, 64%), some students preferred three modes (trimodal, 31%), and very few students preferred all four modes (quadmodal, 5%). [Figure 2]
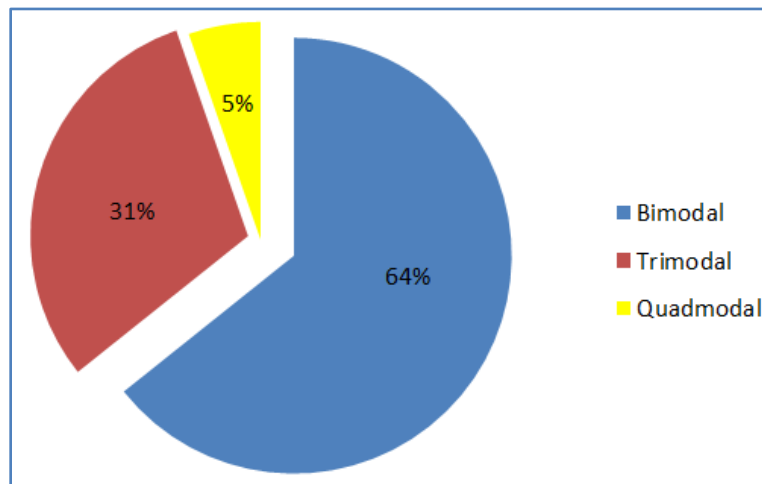
Fig. 2: Percentages of multimodal students who preferred two, three, or four modes of learning

Among the students preferring only one mode of learning, majority of them were auditory learners (21 out of 37) followed by kinaesthetic learners. [Figure 3] There were no visual unimodal learners.
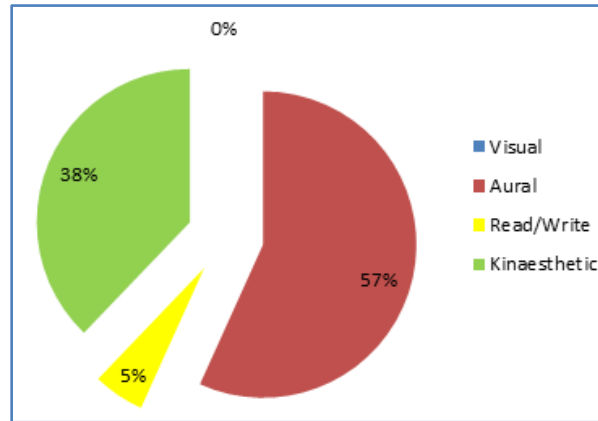
ORIGINAL ARTICLE

Fig. 3: Sensory modality preferences among students with a single learning style (Unimodal)

The total individual scores in each category are shown in Table 1. The highest score is for aural learning (635) and lowest for visual learning.

VARK component	Individual score
Visual	326
Aural	635
Read/Write	393
Kinaesthetic	629
Table 1: Total individual scores in each category	

Figure 4 shows the overall distribution of scores of all modalities of learning styles. The commonest learning preference is auditory-kinaesthetic (AK), a bimodal category. The second mode of learning preferred by students is auditory (A), a unimodal category. The common trimodal preferences were ARK and VAK (8 students in each category).
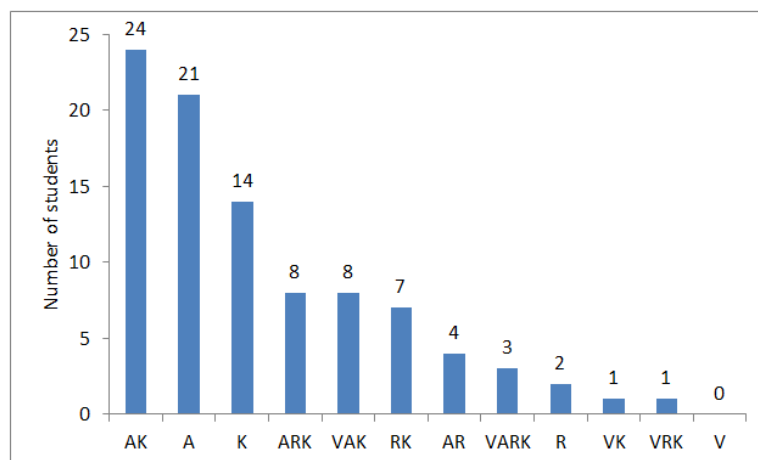

Fig. 4: Number of students in all modalities of learning

ORIGINAL ARTICLE

No significant difference was found in preference between the sexes ($p>0.05$). [Figure 5] Figure 6 shows the breakup of male and female unimodal learners. There was no significant difference in individual sensory modality preference among unimodal learners ($p>0.05$).
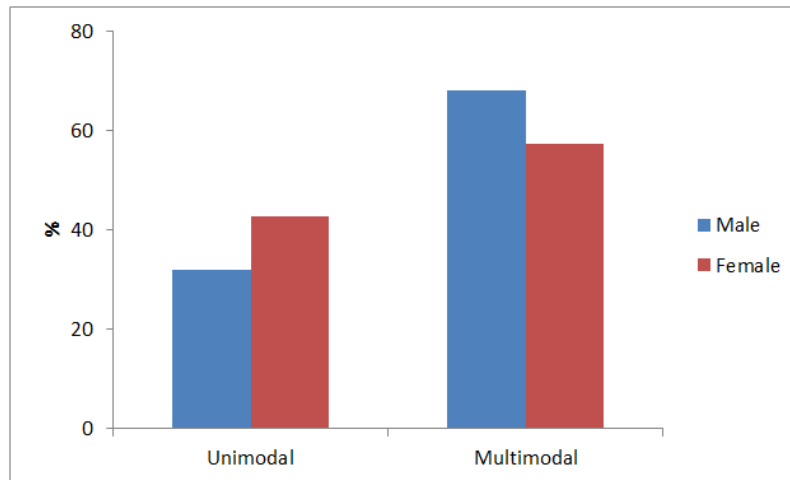
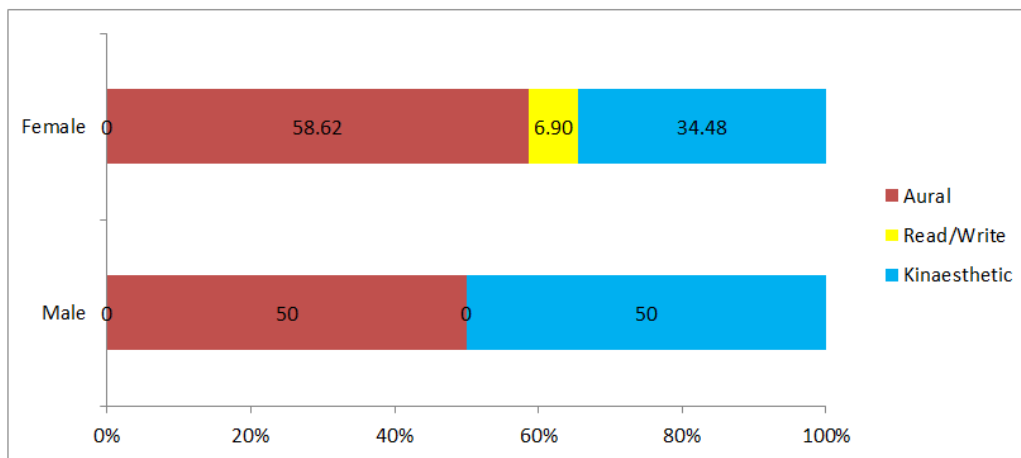

Fig. 5: VARK mode distribution based on sex

Fig. 6: Preferences among students with a unimodal learning style based on sex (no visual unimodal learners among both sexes)

DISCUSSION: VARK questionnaire was administered to the first-year medical students to determine their learning preferences. The majority of the students in our study had multiple learning preferences (60.2%). The predominant mode of learning preferred among unimodal learners was aural (57%) preceded by kinesthetic (38%). The aural preference among students can be easily attributed to teaching method in our schools and colleges where students have to listen to the lectures in the classroom. No significant difference was found in preference between the sexes.68% of males and 57.35% of females were multimodal. Among students with unimodal

preferences, majority of female students (58.62%) were aural learners. Equal number of male students (50%) preferred aural and kinesthetic mode of learning. There were no male students (unimodal) who prefer read write mode. But these differences among sex were not significant (Chi square test).

Urval et al[7] found out that the majority of second-year undergraduate medical students in their study had multiple learning preferences (68.7%). The predominant sensory modality of learning among unimodal learners was aural (45.5%) followed by kinesthetic (33.1%). The learning style preference was not influenced by sex.

A study done by Samarakoon et al.[8] showed that the majority (69.9%) of first year medical students had multimodal learning styles, unimodal being only in 30.1%. Among the unimodal learners, the most of them were auditory learners (50%). Among the multimodal learners, 30.1% were bimodal learners with AR (50%) and AK (31.8%) types predominating. Among post graduates students, the majority were unimodal (52.9%) learners with 33.4% having kinesthetic type. Change from didactic learning to practicality, as well as reduced amount of lecture time and encouragement by trainers to develop self-learning are the reasons for this shift to kinaesthetic learning in post graduates.

A study by Nuzhat et al[9] on pre-clinical medical students in Saudi Arabia showed multimodal learning preference (72.6%). Majority of unimodal students prefer aural mode of learning.

In a study done by Tanwinit et al[10] among musical students, 66.1% students were found to be multimodal, with majority having aural preference (62.7%).

A VARK study done by Kharb et al[11] showed that majority (61%) of the first semester medical students had multimodal VARK preferences - 41% (bimodal), 14% (trimodal) and 6% (quadrimodal). The most common unimodal preference was kinaesthetic, followed by visual, auditory and read and write.

A study done on first-year medical students in Turkey[12] showed multimodal preference in 63.9%. Among the students having unimodal preferences, most of them were kinaesthetic learners and read write learners being the minority. Preferred multiple modes were: Bimodal (30.3%), trimodal (20.7%), and quadrimodal (12.9%). The learning styles did not differ between male and female students.

Lujan et al.[13] found out that majority of first-year medical students (63.8%) had multimodal learning preference with only 36.1% having a unimodal preference. Among those with unimodal preferences, 18.1% (of all students) preferred kinesthetic mode, 7.8% preferred printed words, 5.4% preferred visual; only 4.8% preferred auditory mode. Of the 63.8% of students who preferred multiple modes of information presentation, 24.5% were bimodal, 32.1% were trimodal, and the majority preferred all four modes (quadrimodal, 43.4%).

A study by D'Amore et al[14] showed a predominance of kinesthetic style of learning among first year nursing students in Australia.

A study among clinical students comprising of a mixed population[15] showed that 56% were multimodal and 44% were mono-modal and. The multimodal comprised of all three subgroups, i.e., quadrimodal, trimodal, and bimodal. In the unimodal category, the highest preference was for kinesthetic mode.

ORIGINAL ARTICLE

Most students (60.2%) in our study have preference for multiple modes of learning. These students want information to arrive in a variety of modes. Thus, teachers should use active learning strategies instead of traditional lecture method.[16] Active learning strategies cater to all types of students. Some of these strategies are - use of models and demonstrations[17,18] (for visual learners), topic discussion and debates[19,20] (for aural learners), role playing[21] (for kinaesthetic learners).

Many of these strategies are included in the current Medical Council of India (MCI) guidelines[22] for undergraduate medical education. These guidelines clearly state that didactic lectures should not exceed one third of the time schedule while two third schedule should include practicals, clinicals and group discussions.

CONCLUSIONS: Most of the students in our study were multimodal learners. No difference in learning style was found between male and female students. As different students have different learning styles, the teacher should use combination of teaching strategies.

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ORIGINAL ARTICLE

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