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Learning Style Preferences among Allied Health Science Students using VARK Model – A Cross-sectional Study

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Abstract

Background: *Learners exhibit diverse preferences in how they absorb information, influenced by factors such as mindset, sensory abilities, and personal inclinations. Recognizing and accommodating these varied learning styles is essential in selecting teaching methods that can effectively enhance the overall educational experience*

The learning preferences of paramedical, allied science andmedical students are diverse, posing a challenge for teachers to cater to all of them. VARK, which stands for Visual, Auditory, Read/write, and Kinaesthetic learning styles, is a learning inventory categorized under the "instructional preference" model.

Methods

This study was done to analyze the learning style and approaches to learning among the 392 Allied Health Science students at Sree Balaji Medical College & Hospital, BIHER university Chennai using VARK questionnaire version 7.8.

Results: *This study identified17 (4%) as unimodal and all of them preferred auditory modality, 77 (20%) trimodal, 3 (1%) quadrimodal and 295 (75%) bimodal.*

The trimodal styles include ARK,ARV,KAR,KAV,KRV,RAK,RAV,RKV,VAK,VAR,&VRK and the most preferred one among the trimodal style was ARK. The bimodal styles include AK,AR,AV,KA,KR,KV,RA,RK,RV,VA,VK&VR styles. The most preferred among all the learning styles was AK style.

Conclusion: *Since the most preferred learning styles were kinaesthetic and auditory, the strategies of teaching preferred by students could include recording lectures and creating audio recordings of PowerPoint presentations, as well as increasing the frequency of early clinical exposure to patients in hospital wards and using models and problem-solving questionnaires. This will also enable teachers to align their lessons with the students' needs and assist them in reaching their academic objectives*

INTRODUCTION

Effective teaching indeed hinges on a deep understanding of how students learn. Learning styles refers to the systematic differences in how individuals acquire and process information. These styles emphasize the varied sensory modalities—visual, auditory, kinesthetic, and morethat influence a learner's experience. Proponents argue that tailoring teaching methods to these styles could enhance the learning experience by addressing each student's unique preferences. However, there has been debate over the practicality and empirical validity of learning styles. Some research challenges whether teaching to specific styles (e.g., visual learners being taught primarily with images) truly enhances learning outcomes. Instead, some educators advocate for a more

flexible and diverse teaching approach, using a range of methods that engage multiple modalities, thus benefiting all learners.For students, whose background and cognitive characteristics differ widely, it is essential to consider not only their learning preferences but also factors like their prior knowledge, emotional state, and motivation. Effective teaching in this context often involves a mix of approaches: direct instruction, collaborative work, active learning, and the use of technology to cater to a diverse student body.

The idea of individualized learning styles became popular in the 1970s [1].To analyze learning styles, various models have been proposed, such asKolb's Learning Style instrument, Learning Style Questionnaire, the Canfield Learning Style Inventory, Index of Learning Survey , and Cognitive Styles Analysis [2] .VARK (Visual- V, Auditory- A, Read/Write - R, Kinesthetic- K) is a learning inventory classified under the "instructional preference" model. It classifieslearning styles based on sensory preferences. VisualLearners will prefer diagrammatic representations such as pictures, graphs, and flow charts. Auditory Learners will choose to process information by listening to lectures, tutorials, and seminars.Read/Write Learnerswould like to take notes and repeatedly read the written words. Kinesthetic (K) Learners willlearn by connecting to real-life experiences and acquiring information through practice [3& 4]. Additionally, some students fall into a "multimodal" category, combining multiple learning styles from VARK.This study using VARK questionnaire was done for its simplicity and reliability. VARK model that consists of study strategies for each style, may be helpful to formulate teaching methodologies based on the preferences of the students.

Numerous research on learning style preferences has been conducted, and the results are very inconsistent, sug gesting the learning styles of students are diverse. With this knowledge we were interested in understanding the learning style among Allied Health Science (AHS) Students at Sree Balaji Medical College & Hospital Chennai, which would help both the students and the instructors toidentify the prevailing learning style and alterthe existing teaching methods.

MATERIAL AND METHOD:

This study was conducted among 392 AHS students aged 18 and above of which 301 were females and 91 were malesat Sree Balaji Medical college and Hospital, Chennai, after obtaining Institutional ethics committee approval. VARK Questionnaire version 7.8 was downloaded after permission was sought from the developers. The Questionnaire was administered using google form to students who gave consent.

STATISTICAL ANALYSIS

The responses were tabulated in Microsoft excel and were scored by double blind method using reference data. The scores of students learning style preferences were calculated and statistically analyzedand proportions were reported for categorical values.

RESULTS:

The studypopulation included students of age 18 and above of which 301 were females and 91 were males. Table 1 displays the general characteristics of the study population.

Table 1. General Characteristics of the Study Subjects

	Male	Female
Gender	91(23.2%)	301(76.7%)
Average Age	19.01	19.911
Native		
Rural	36	90
Urban	39	173
Not sure /Prefer not to say	59	

VARK Questionnaire consists of 16 statements; each statement had four different choices reflecting the preference for learning modality as per VARK. The participant could choose only one response for each statement. So, from 392 subjects we received an amalgamated 6272 responses. These responses were categorized and are displayed in Figure I. The auditory learning style is the preferred of all modalities

followed by Kinesthetic

Figure I – Response percentage for each modality of amalgamated VARK Categories

Thelearning preferences for each question were tabulated for every study participant. Figure II depicts the method ofscoring and the total scores for each modalitywere tabulated and ranked. The modality that got the maximum marks was considered the preferred learning category.

QUESTIONS	MODALITY PREFERRED		
1	A	TOTAL NUMBER OF Vs	3
2	A	TOTAL NUMBER OF As	5
3	V	TOTAL NUMBER OF Rs	5
4	R	TOTAL NUMBER OF Ks	3
5	A		
6	R	Result : Bimodal AR as both have equal	
7	A	score and difference of the next modality	
8	A	is more than 1.	
9	R		
10	V		
11	K		
12	R		
13	K		
14	K		
15	R		
16	V		

Figure II – Score chart of a subject

If two or more learning categories scored the same or had a difference of one, they were categorized as bimodal, trimodal and quadrimodal respectively. The participants who scored 10 and more for one learning preference were categorized as unimodal. Among the 392 respondents 17(4%) were unimodal and all of them preferred auditory modality. Figure III represents the percentage of preferred learning style. 77 (20%) were trimodal, 3 (1%) quadrimodal and 295 (75%) were bimodal.

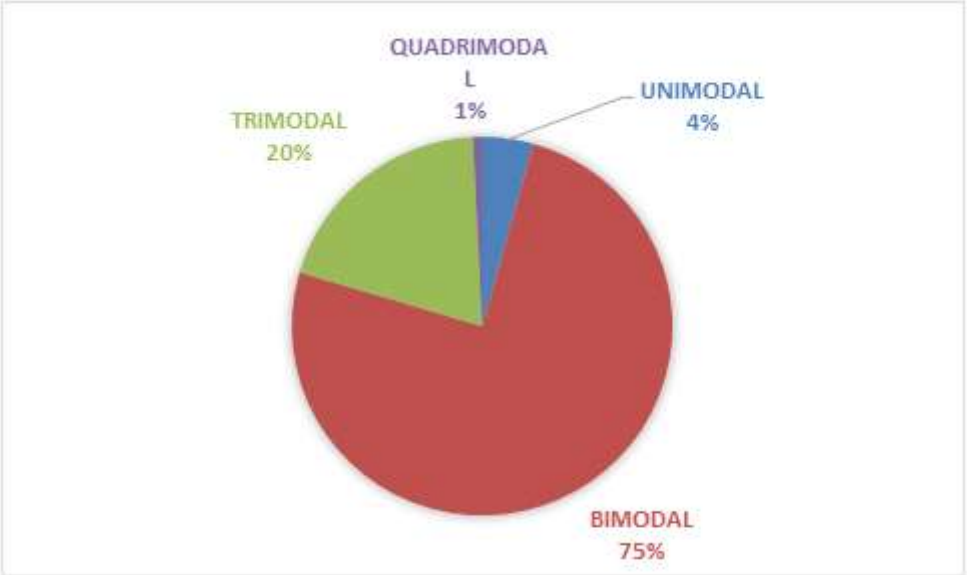

Figure III – Learning Styles distribution

The trimodal styles included ARK, ARV, KAR, KAV, KRV, RAK, RAV, RKV, VAK, VAR, &VRK and the preferred style among the trimodal was ARK. The bimodal styles include AK,AR,AV,KA,KR,KV,RA,RK,RV,VA,VK&VR styles. The most preferred among bimodal learning styles were AK style depicted in Table II

Table II – Trimodal and bimodal Styles distribution

Trimodal	number	Bimodal	number
ARK	19	AK	107
AKV	17	AR	66
ARV	14	KA	40
KAV	6	AV	34
KAR	5	RK	10
VAR	5	KV	9
KRV	3	RA	7
RAK	3	VA	7
VAK	2	KR	6
RAV	1	RV	4
RKV	1	VR	3
VRK	1	VK	2
TOTAL	77		295

DISCUSSION

Several studies have shown that medical and paramedical students tend to have a wide range of learning preferences, with many favoring active, problem-based learning (PBL) and interactive environments. These approaches not only make learning more engaging but also align with the demands of clinical practice, where problem-solving and decision-making are paramount. By shifting towards a learner-centered model, medical education encourages students to take ownership of their learning through self-directed study, which is critical for lifelong learning in their profession. This promotes the retention of knowledge as students are actively involved in seeking, interpreting, and applying information rather than passively receiving it. Problem-based learning, case studies, simulations, and hands-on clinical experiences are particularly effective in this regard, as they mirror real-world medical scenarios and enhance both knowledge retention and practical skills.This

approach will cultivate critical thinking and problem-solving skills in students, preparing them for future challenges. [5]

Incorporating diverse teaching methods to cater to various learning styles in such an intricate field can also help ensure that students with different strengths—whether visual, auditory, kinesthetic, or analytical—are all effectively engaged and supported. This comprehensive approach aligns well with the goal of preparing future healthcare professionals for the complexities and challenges of their careers.

Learner engagement is crucial for identifying effective learning tools.Recent studies show that when learners are actively involved, they can optimize their learning process by leveraging tools tailored to their individual learning preferences.[6]Dunn et al. has defined the “learning styles” as different and unique ways used by individuals to learn and recall information.[7]Studies have indeed demonstrated that identifying student’s learning styles and approaches can significantly influence their academic success. Understanding students' learning preferences enables educators to adjust their instructional strategies, catering to visual, auditory, kinesthetic, and multimodal learners. This alignment can make learning more efficient, engaging, and effective, thereby contributing to improved academic outcomes. [8]The VARK learning style inventory measuresthe four sensory modalities used for learning, such asvisual, auditory, read/write and kinesthetic. Learners can be categorized as unimodal (single preference) or multimodal (multiple preferences) based on their individual learning style inclinations.[9]Among the unimodal learning preferences,most preferredwas auditory and kinesthetic learning style. Among multimodal learning style preferences, KA and VAK styles were predominant. [10] There is no single best teaching-learning approach that can cater for every student, teaching strategies must be tailored to meet individual student needs, as evidence suggests that problem-based learning and similar approaches can outperform traditional lecture-based methods. [11 & 12]Research in neuroscience indicates that learning environments aligned with students' dominant learning styles can significantly enhance effective learning [13]. This is known as the “meshing hypothesis” [14].

Our research identified a multimodal learning preference among most students, leading to recommendations for increased multimedia integration to support varied learning.Our research revealed no gender-based differences in learning style preferences, but female students demonstrated greater variability in their preferences, consistent with Slater et al.'s findings at Wayne State University."[15].Awareness of learning style diversity allows teachers to adopt flexible instructional methods, blending strategies to meet the unique needs of each student and foster academic success(16). Since the dominant learning styles were kinesthetic and auditory, adoption of strategies such as recorded lectures, audio-enhanced PowerPoint presentations, early clinical exposure to patients, model-based learning, and problem-solving questionnairesmay be beneficial to student learning.

CONCLUSION

To maximize student learning, educators should identify students' preferred learning styles and employ diverse teaching approaches, including visual, auditory, and kinesthetic techniques, creating an engaging and interactive classroom environment. A multisensory approach, combining visual, auditory, and kinesthetic techniques, enables teachers to create an engaging and interactive learning space. This inclusive approach guarantees effective communication to diverse learners, challenging each student and making them self-sufficient, independent learners.

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