



Differences in Learning Style Preferences Among Medical and Engineering Students in South Bangalore

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Abstract:

1.1. Background: Learning style preferences vary widely among students. It is vital for teachers to understand the learning preferences of their students to ensure effective learning among students.

1.2. Aim: To understand the learning modalities of medical and engineering students, to compare the similarities and differences between the two groups.

1.3. Method: A cross-sectional study of 75 medical and 75 engineering students was conducted. A VARK questionnaire was used to assess the preferred study mode of the students. The questionnaire consists of 16 questions which identifies four perceptual preferences (V-visual, A-Auditory, R-Read/Write, K-Kinesthetic). Descriptive statistics were used to analyze the data.

1.4. Results: The response showed that the overall percentage of unimodal learners was 96% and multimodal learners 4%. Of the unimodal learners, the percentage distribution of single visual 32.41%, single auditory 17.24%, single read/write 11.72%, single kinesthetic 38.62%.

1.5. Conclusion: The results of this study can provide information to improve the teaching efficacy based on learning preferences of the students.

2. **Keywords:** Learning styles, VARK, Medical students, Engineering students

3. **Abbreviations:** VARK- Visual, Auditory, Read/Write. Kinesthetic

I. INTRODUCTION

Learning is the process of acquiring new or modifying existing knowledge, behavior, skills, values and preferences ⁽¹⁾. The teaching process and learning styles have evolved significantly over many years. The recent advances in technology have unraveled a plethora of modalities of learning which makes the process more interesting and effective. Keefe (1987) defined learning style as “composite of characteristic, cognitive, affective and physiological characters that serve as relatively stable indicators of how a learner perceives, interacts with and responds to the learning environment.” ⁽²⁾ The awareness of the psychological aspects of the learning process helps in analyzing an education system in a detailed manner. Due emphasis in identification of influencing variables in the learning process, scientific analysis of the effect of each of such variables on the learning process and application of the results inferred through such studies have contributed in further refinement of the education systems and learning processes. Each learner has his or her own preference of learning styles, which might be effective for them to achieve learning objectives. Nonetheless, not all preferred learning styles suit each learner. There are variables that may influence the suitability and the effectiveness of the learning styles. Four sensory modalities described by Fleming are- Visual (V), Auditory (A), Read/Write (R) and Kinesthetic (K) ⁽³⁾. Briefly, this implies that different students prefer different sensory modalities to absorb knowledge and learn effectively.

This study was done to understand the learning modalities of medical and engineering students, to compare the similarities and differences between the two groups to design a more effective learning system based on the preferences of students.

II. MATERIALS AND METHOD

The survey was conducted at Bangalore Medical College and Research Institute and DayanandSagar of Engineering, Bangalore in October 2017. The study was approved by the head of the institution.

2.1. Instruments

A VARK questionnaire was used to assess the preferred study mode of the students. The questionnaire measures four perceptual preferences (V-visual, A-Auditory, R-Read/Write, K-Kinesthetic). It consists of 16 questions with four options each. The purpose of each question is to categorize the learning style preference of the respondents. Respondents can leave questions blank as well as choose more than one option for identifying preferences for multiple learning styles. Student questionnaires were scored and tabulated to determine the distribution of learning styles.

2.2. Participants

Second year medical students of Bangalore Medical College and second year engineering students of DayanandSagar of Engineering. 150 students (75 medical and 75 engineering students) participated in it after giving consent.

2.3. Statistical Analysis

Data entry and analysis were performed with SPSS (Version 11.0, Chicago, United States of America). Mean and standard deviations were obtained for all the VARK scores. Number of observations and percentages were obtained for each study method for both medical and engineering students. Comparison between learning styles in engineering and

medical students was determined by Chi-Square Test. Chi-Square values and *P* values were obtained.

III. RESULTS

Overall percentage of unimodal learners was 96%, which was marginally more prevalent among engineering students (100%) as compared to medical students (93.3%). The overall representation of multimodal learners was 4%, of these bimodal were 21.33%, trimodal 4%, quadrimodal 2.66%. The engineering group (49.33%) had more multimodal styles in comparison to the medical group (6.67%). 36% engineering students showed bimodal preference whereas only 6.67% of medical students showed bimodal preference. The engineering students also had trimodal (4%) and quadrimodal (2.66%) styles which was not observed in the other group. Of the unimodal learners, the percentage distribution of single visual 32.41%, single auditory 17.24%, single read/write 11.72%, single kinesthetic 38.62%. Among medical students, unimodal learners' distribution was as follows: single visual 37%, single auditory 31%, single read/write 16%, single kinesthetic 16%. This is represented in **Figure 1**. Among engineering students, unimodal learners' distribution was as follows: single visual 28%, single auditory 4%, single read/write 8%, single kinesthetic 60%. This is represented in **Figure 2**. The comparison between the learning style and study course is represented in **Table 1**. The mean and standard deviation of engineering and medical students are represented in **Table 2** and **Table 3** respectively.

IV. DISCUSSION

This study was aimed at analyzing the learning preferences among engineering and medical students. The information from this study can be implemented to formulate new teaching styles and incorporate teaching aids appropriate to the learning preference of the students. The VARK questionnaire is a reliable instrument to assess the various learning style preferences and has been used in numerous researches for the same. Variations in learning styles are affected by numerous factors such as the characteristic of students, the nature of study, gender, age and culture. The analysis in our study is based on the nature of study. Out of 150 students, overall percentage of unimodal learners was 96%, which was marginally more prevalent among engineering students (100%) as compared to medical students (93.3%). This is similar to a study done by Noor Zainab Abdul Razak et al⁽⁴⁾, where 79.3% engineering and technology students had a unimodal preference, and a study by Latha et al⁽⁵⁾ where 51.5% medical students preferred unimodal style. However, studies by Urval P. Rathnakal et al⁽⁶⁾ and BurcuDevrimIctenbas et al⁽⁷⁾ suggested that multimodal learning was preferred among medical and engineering students respectively. Of the unimodal learners, the percentage distribution of single visual 32.41%, single auditory 17.24%, single read/write 11.72%, single kinesthetic 38.62%. This shows that majority of students prefer the kinesthetic style of learning. This is in accordance with previous studies done by Tierney and Bruton⁽⁸⁾, and BurcuDevrim et al⁽⁷⁾. In our study, majority of engineering students preferred kinesthetic style (60%) which agrees with the findings of BurcuDevrim et al⁽⁷⁾. In contrast, medical students preferred Visual style (37%). This finding differs from the study done by Urval et al⁽⁶⁾, in which Auditory (45.5%) and kinesthetic (33.1%) were the preferred mode, and the study by Baykan and Nacar⁽⁹⁾, where 23.3% of 155 medical students preferred Kinesthetic style. Thus, the information on

the learning preferences among students is vital in formulating targeted strategies that cater to specific needs of the students. The use of various modalities by the educators can help in reaching many more students and improve the student-teacher relationship. Only 4% learners in this study showed multimodal preference among which the engineering group (49.33%) had more multimodal styles in comparison to the medical group (6.67%). This is in agreement with the study done by BurcuDevrim et al⁽⁷⁾, where 25.2% engineering students showed multimodal preference. However, in regard to the medical students, this is in contrast to the studies done by Urval et al⁽⁶⁾ (68.7%) and OjehNkemcho et al⁽¹⁰⁾ (60.7%) which showed multimodal preference. The engineering students also had trimodal (4%) and quadrimodal (2.66%) styles which was not observed in the other group. Thus, we encountered a significant variation in the learning preferences among medical and engineering students especially with respect to Kinesthetic style ($p=0.0000$). While engineering students preferred this method (60%) over other methods, Visual learning was the method of choice among medical students. Since medical students prefer visual style, data can be depicted by incorporating charts, graphs, figures, flowcharts and other visual tools to improve the efficacy of learning. On a similar note, laboratory applications where students get their hands-on experience can support and improve the learning of engineering students⁽⁷⁾. The VARK methodology encourages utilization of different learning styles to augment the learning experience. Thus, students are not limited to a single style of instruction and their learning styles can be made to converge to a common goal of understanding and benefitting from the course.

V. LIMITATIONS OF THE STUDY

Limited sample size is a major limitation. Further analysis with a larger sample size and multi-centric studies are required to adopt appropriate strategies of teaching. Factors that can influence the outcome such as current teaching methods, gender and demographic differences were not taken into consideration.

VI. CONCLUSION

It is evident from this study that a plethora of learning style preferences are seen among students from different groups and hence a standard lecture pattern may not benefit all the students. Therefore, proper streamlining of resources by taking their preference into consideration is important to facilitate the learning process among students.

VII. CONFLICTS OF INTEREST: NONE

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IX. FIGURES



Figure.1. Unimodal learning style preferences among medical students

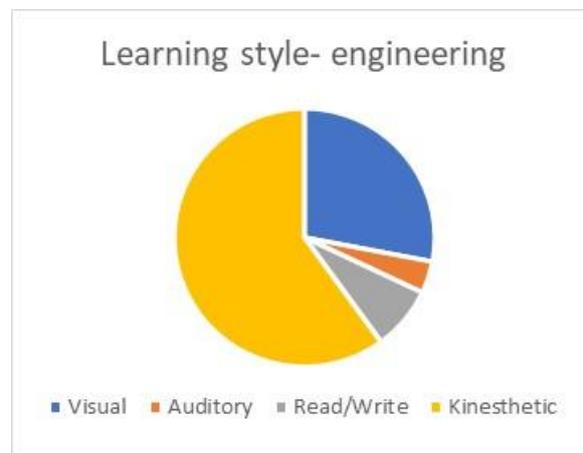


Figure.2. Unimodal learning style preferences among engineering students

Table.1. Comparison between the learning style and study course

	Only Visual- yes	Only visual -no	
Medical	26	49	75
Engineering	21	54	75
			Chi -0.775, p- 0.3788
	Only auditory - yes	Only auditory – no	
Medical	22	53	75
Engineering	3	72	75
			Chi –17.328, p- 0.0000
	Only reading - yes	Only reading - no	
Medical	11	64	75
Engineering	6	69	75
			Chi –1.659, p- 0.1978
	Only kinaesthetic -yes	Only kinaesthetic -no	
Medical	11	64	75
Engineering	45	30	75
			Chi- 32.941, p- 0.0000
	Unimodal- yes	Unimodal - no	Total
Medical	70	5	75
Engineering	75	0	75
			Percentage
Medical			93.33%
Engineering			100%

Table.2. Mean and standard deviation among engineering students

Learning Style	Mean	Standard deviation
VISUAL	5.48	4.874
AUDITORY	5.36	3.911
READ/WRITE	4.88	4.432
KINESTHETIC	6.36	3.278

Table.3. Mean and standard deviation among medical students

Learning Style	Mean	Standard Deviation
VISUAL	5.68	2.5793
AUDITORY	5.4267	2.7122
READ/WRITE	4.96	2.1209
KINESTHETIC	3.9333	2.3899