



# Influence of Gender on Learning Style Preferences among Undergraduate Students of Various Disciplines of Education

Running Title: Influence of Gender on Learning Style Preferences

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## ABSTRACT:

**Background:** Learning style refers to gathering, processing, interpreting, organizing, and thinking of various information. Each student acquires information through different learning styles. In the contemporary, it is essential for the students to know their own learning style so that they can involve actively in processing information and thus maximizing their learning process.

**Objective:** The objective of our study was to analyze the influence of gender on learning style preferences among undergraduate students of various disciplines of education from selected Indian universities.

**Methodology:** This cross sectional study was conducted in selected Indian universities. Final year students of various disciplines of education who were willing to participate in the study were selected. After obtaining their consent for participation, hard copies of VARK questionnaire including the demographic details was administered to the students to analyze their preferred learning styles.

**Results:** In general, there is no gender difference in preference style on visual, aural and kinesthetic learning but female students show more preference on read/write learning than males. In BE and BDS, male students mostly prefer visual learning style than female counterparts. However, visual learning is more preferred by female students in other disciplines (BBA, BPT, BALLB, B.Sc Nursing).

**Conclusion:** Therefore, this study will help in empowering the students to learn more effectively by having an insight on the study skills suggested for their preference modality.

**KEY WORDS:** Learning Styles, VARK questionnaire, Gender

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## INTRODUCTION:

Learning style preferences are a popular concept in psychology and education and are intended to identify how people learn best. A

learning style is, rather a description of a process or of preferences. Undergraduate Students arrive with different educational backgrounds with a diverse range of learning

experiences. Consequently, students would have developed preferred approaches to acquiring and processing information or learning style preferences. Thus understanding learning style preferences is important to be successful in learning. However, little is understood about how learning styles impact learning and performance across various disciplines, and different subjects. Knowing the learning preferences encourages a learner to think about the way he or she learns is a useful step towards understanding and hence improving learning and aiming at success. Learning preferences of the students can also allow the teachers to develop strategies, more appropriate which is more likely to be understood and motivating.<sup>[1]</sup> The VARK questionnaire identifies student's preferences for particular modes of information presentation. The VARK model of learning styles suggests that there are four main types of learners: Visual learners(V), Auditory learners(A), Reading/Writing learners(R), Kinesthetic learners(K). Visual learners learn best by seeing graphic displays such as charts, diagrams, illustrations, handouts, and videos. Aural learners learn best by hearing information, like listening to class lectures, rather than reading from the textbook, and they tend to get a great deal out of lectures. Reading and writing learners prefer to take in information primarily text based and they make notes during lectures, as well as while reading text books. Kinesthetic learners learn best by hands-on experience, for them sitting still for long periods of time is difficult, they enjoy performing tasks that involve directly manipulating objects and materials. When the VARK model questionnaire is administered to the undergraduate students, many recognize and agree that they fall into a particular learning style, others might feel that they fall into more than one learning styles. With reference to a study, students possess a wide diversity in learning preferences, thus it is mandatory for the teachers to effectively deliver according to the needs of the students with multimodal approach information presentation, to draw the attention and motivation of the students.<sup>[2]</sup> Study reported

on the comparison of performances in the class room and grades of multiple mode learners with single mode learners with the gender effects.<sup>[3]</sup> Report from a study on learning preference to find out any significant differences among classes, gender, inter-class differences varied, and gender differences were not significant<sup>[4]</sup> and another study also reported that although there was no significant difference between genders, the female student population tended to be more diverse than the male population, encompassing a broader range of sensory modality combinations within their preference profiles.<sup>[5]</sup> There are few reports on the studies conducted to know the differences in learning styles between male and female students, and the effect it has on academic performance revealed significant differences in learning style preferences among genders, and its implications on academic performance of medical students.<sup>[6,7,8,9]</sup> Personalized learning addresses that understanding their own learning preferences can make studying more enjoyable, thereby better consolidation of memory. Although it is not clear whether tailoring instructional methods for a student's preferred learning style improves educational outcomes, however it is hypothesized that based on the diverse learning styles if the teacher designs appropriate modes of teaching, it can enrich the students learning experience. Although there are few reports on association between gender and learning style preferences, there is a noticeable lack of conclusive report. Hence in the present study we planned explore the association between gender and learning style preferences among undergraduate students of various disciplines of education, an approach to understand students preferred learning styles, thus to plan future course design and application of better teaching approaches and techniques. Further for the students self-realization of which learning style they belong to will be helpful him/her to improve the performance by sticking on to the preferred learning style or by adopting new learning techniques.

#### **MATERIALS AND METHODS:**

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This cross sectional study was conducted among students studying MBBS, BDS, BPT, BE, B.Sc Nursing, BBA and BALLB in selected universities in Vellore district of Tamil Nadu, India. By universal sampling, a total 820 students (both male and female) aged between 21 -23 years who were willing to participate in this study were selected. Students who were absent and writing exams were excluded from the study. The purpose and objective of the study was clearly explained to the students through an information sheet and they were informed that their participation was optional. It was emphasized that all the data collected will be kept strictly confidential. After written informed consent was obtained, hard copy of the latest version of VARK Questionnaire (Version 7.8) which is a 16 itemed, self-reporting, multi choice questionnaire was distributed to collect the data of the students.<sup>[10]</sup> The students were permitted to choose 2 or more options for a question or even omit a question if appropriate. The time taken to complete the questionnaire was approximately 10 – 15 minutes. **Statistical analysis:**Independent t test was performed to compare the average number of responses between male and female. Decision rule is based on the p-value 0.05.

**RESULTS:**

**Background nature of the respondents:**

Total of 820 students were involved in this study and mean age of the student is 21.42 years old with SD 0.585. Total 394 female and 426 male students were involved and male shows 52% whereas female shows 48%. One third of the respondents (31%) are BE students and the second highest are MBBS students (22%). These are followed by BALLB, BDS, BBA, BPT and B.Sc Nursing.

**Table 1: The independent t test analysis on gender and their preference of reading/writing learning**

Gender	N	Mean	Std. Deviation	Std. Error Mean	p-value
F	394	7.59	7.789	.392	0.025
M	426	6.38	7.597	.368	

**Gender and their preference on kinesthetic learning:**

The mean preference for female is 9.24 whereas male shows 8.83. The Lavene’s test

**Gender and their preference on visual learning:**

The respondents’ preferences are compared against the gender by using independent t test The Lavene’s test for Equality of Variances of preference on visual learning in between male and female students is met (F =0.286, p-value>0.05). The mean preferences on visual learning are 8.64 times for female students and 7.96 times for male students. However, there is no significant difference in the visual learning as their preferences between males and females, showing t (818) =1.220 with p value >0.05 (CI -.410,1.76).

**Gender and their preference on aural learning:**

The average frequencies of choosing aural learning as their preferred method are 4.96 for females and 5.56 for males. The Lavene’s test for Equality of Variances of preference on visual learning in between male and female students is not met (F =5.086, p-value<0.05). There is no gender difference in preference style on aural learning, showing t(815)=1.169, p-value>0.05.

**Gender and their preference on read/write learning:**

The mean preference is 7.59 for female whereas male shows 6.38. The Lavene’s test for Equality of Variances of preference on visual learning in between male and female students is not met (F =15.360, p-value<0.05). According to the results, the significant difference is seen in between male and female with 1.206 mean difference, t (809.384)=2.242 and CI (0.15,2.26). Female students prefer more on read/write learning than male students with high effect size (Cohen’s d=12.6) as shown in table 1.

for Equality of Variances of preference on visual learning in both genders is met (F =0.986, p-value>0.05). Preference on kinesthetic learning is not statistically

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difference in between male and female, showing  $t(818)=0.760$ ,  $p>0.05$ , CI - 0.648, 1.468.

#### **Learning style among MBBS students:**

Total number of male and female students in MBBS course are 86 and 97 respectively. According to independent sample t test, there are no statistically significant differences between gender and their preferred learning styles among MBBS students. Two-tailed p-value shows  $>0.05$  for all learning styles related to gender.

#### **Learning style among BE students:**

Total of 153 males and 108 females were in BE. Significant mean differences are explored by using independent sample t test and Lavene's test of equality of variances. Significant mean difference is found in between gender and visual learning style among BE students, showing  $t(240.9)=2.261$ , p-value  $<0.05$  ( $p=0.025$ ). Male students more prefer visual learning style than female engineering students with mean difference 2.120. Equal variances not assumed, and CI is ranging from 2.73 to 3.96.

#### **Learning style among BDS students:**

Total number of students in BDS are 44 males and 48 females. Independent sample t test is carried out to find the mean differences between the two groups.

According to the result, significant mean difference is seen in kinesthetic learning style in between male and female, comprising  $t(84.87) = -2.525$ , p-value  $<0.05$  ( $p=0.013$ ), CI (-6.865, -0.817). In BDS, male students prefer visual learning style than female students with 3.84 mean difference.

#### **Learning style among students of other disciplines (BBA, BPT, BALLB, B.Sc Nursing):**

According to the results, female students prefer visual learning style than male students in other disciplines, comprising  $t(281.97) = 2.725$ , p-value  $<0.05$  (p-value=0.007, CI (-4.343, -0.700)). Mean difference for choosing visual learning as their preferred method is 2.522. There are no significant different preferences in between male and female on auditory, reading and kinesthetic learning.

#### **DISCUSSION:**

Awareness of different learning styles is important for educators to tailor instructional

strategies and methods to cater to the learning needs of students and to create an environment which is conducive to learning.

Do men and women learn differently? Are there male and female preferences in learning styles rooted in evolutionary biology? The answer to these questions may alter the way in which we teach.

The purpose of the study was to assess gender differences in learning style preferences among undergraduate students of various disciplines. To address this important issue we administered the VARK questionnaire to the undergraduate students pursuing MBBS, BDS, BE, BBA, BPT, BALLB and B.Sc Nursing. The responses were tallied and assessed for gender differences in learning style preferences.

A total of 820 students participated in the study voluntarily. Total 394 females constitute 48% of the population and 426 males students add up to 52%. It was observed that a vast majority of the students are multimodal learners. Among these the tetramodal form was most common. No differences were observed in modal distribution by gender.

Amongst the four sensory modalities for learning, visual, aural and kinesthetic way of learning was preferred by both the genders almost equally. However, a significant difference was seen with the read/write method of learning. More female students preferred the R-A mixed sensory modality of learning over their male counterparts.

A comparison of gender differences in learning styles amongst the students of various disciplines has once again proved that they were all multimodal learners. While the undergraduate students pursuing MBBS showed no statistical gender difference in learning styles, it is not the same with other disciplines. Male students studying BE preferred visual mode of information presentation in comparison to female students. Kinesthetic learning style was less preferred by the female students when compared to the male students pursuing BDS. A majority of female students preferred visual learning style than the male students in other disciplines which include Law, Business application, Bachelor of nursing etc.

Students can use a variety of modes for learning; however, one mode can be dominant and preferred or there can be equal preference for one or more modes. Our study revealed that most students are multimodal learners. In our study modality preference was similar between genders; both male and female students reported a preference for learning that utilizes multiple sensory modalities over unimodal learning. These findings agree with other studies that have reported a predominant multimodal style of learning among students across the world.<sup>[8]</sup> In our study, tetramodal was the most common mode of multimodality exhibited by both males and females. This is not surprising; it should be noted that in a general sense, all physically unimpaired students are multimodal, using all their senses to take in information at any given time. This preference for multimodal learning is in agreement with studies of first-year medical<sup>[10, 11]</sup> and dental students.<sup>[4]</sup> Similarly, studies by Dobson<sup>[12]</sup> and Choudhary and Dullo<sup>[13]</sup> also reported a predominant quadmodal method of learning among the students.

A very extensive literature is present on the topic of gender differences in learning. Males and females are unique as far as their learning style preference is concerned. Males have preference for rational evaluation and logic; while female use elaborative processing in which they try to seek personal relevance or individual connection with the material being taught.<sup>[14]</sup> In addition, males are more achievement oriented; while females are more social and performance oriented.<sup>[4]</sup> The genders also differ in their beliefs about what is most important to student learning, with females ranking social interaction with other students and self-confidence as higher than males.<sup>[15]</sup> Furthermore, males are likely to attribute their success in the classroom to external causes, such as teaching, whereas females generally see their success as being directly related to their efforts in the classroom.<sup>[16]</sup> This suggests that females tend to be more contemplative and cautious whereas males tend to be more externally focused.

The knowledge of student preferred learning styles is vital if educators are to provide a customized approach for individual students. Knowing students' preferred learning style also helps to vanquish the tendency of many educators to treat all students in a similar way and motivate teachers to move from their preferred mode to using others. In doing so, they can reach more students because of the better match between teacher and learner styles. In some cases, it may be difficult to tailor coursework to suit individual learning styles of each student, in these situations, the students may contribute to their academic success by promoting self-awareness and the use of learning strategies that work for their learning style.<sup>[17]</sup>

#### **CONCLUSION:**

Student learning style preferences can be determined using the VARK questionnaire, which can assist both the learner and educators to identify individual student preferences in learning. There is a slight difference in learning style preferences between males and females. As such, it is the responsibility of both instructors and students to be aware of learning style preferences to improve learning. As instructors, we need to assess and understand how to reach all students by understanding how to present information in multiple modes. Students must be self-aware of preferences to adjust study techniques to best fit themselves even if the instructions provided do not match their preferred style. It is important to note that the results do not suggest that there is an innate difference in aptitude between genders, nor is it promoting separation of genders in the learning process. This study asserts that males and females have minor differences in preferences in learning style and supports mixed gender classrooms and study groups to allow both genders the opportunity to learn from each other.

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#### **REFERENCES:**

1. Fleming N, Baume D. Learning Styles Again: VARKing up the right tree!

- Educational developments. 2006 Nov 4;7(4):4.
2. Prithishkumar IJ, Michael SA. Understanding your student: Using the VARK model. *Journal of postgraduate medicine*. 2014 Apr 1;60(2):183.
  3. Lujan HL, DiCarlo SE. First-year medical students prefer multiple learning styles. *Advances in physiology education*. 2006 Mar;30(1):13-6.
  4. Murphy RJ, Gray SA, Straja SR, Bogert MC. Student learning preferences and teaching implications. *Journal of dental education*. 2004 Aug 1;68(8):859-66.
  5. Slater JA, Lujan HL, DiCarlo SE. Does gender influence learning style preferences of first-year medical students?. *Advances in Physiology Education*. 2007 Dec;31(4):336-42.
  6. Almigbal TH. Relationship between the learning style preferences of medical students and academic achievement. *Saudi medical journal*. 2015;36(3):349.
  7. Nuzhat A, Salem RO, Hamdan NA, Ashour N. Gender differences in learning styles and academic performance of medical students in Saudi Arabia. *Medical teacher*. 2013 Apr 1;35(sup1):S78-82.
  8. OJEH N, SOBERS-GRANNUM NA, GAUR U, UDUPA A, MAJUMDER MA. Learning style preferences: A study of Pre-clinical Medical Students in Barbados. *Journal of advances in medical education & professionalism*. 2017 Oct;5(4):185.
  9. AlQahtani N, AlMoammar K, Taher S, AlBarakati S, AlKofide E. Learning preferences among dental students using the VARK questionnaire: A comparison between different academic levels and gender. *JPMA. The Journal of the Pakistan Medical Association*. 2018 Jan;68(1):59-64.
  10. Lujan HL, DiCarlo SE. First-year medical students prefer multiple learning styles. *Advances in physiology education*. 2006 Mar;30(1):13-6.
  11. Baykan Z, Naçar M. Learning styles of first-year medical students attending Erciyes University in Kayseri, Turkey. *Advances in physiology education*. 2007 Jun;31(2):158-60.
  12. Dobson JL. A comparison between learning style preferences and sex, status, and course performance. *Advances in physiology education*. 2010 Dec;34(4):197-204.
  13. Choudhary R, Dullo P, Tandon RV. Gender differences in learning style preferences of first year medical students. *Pak J Physiol*. 2011;7(2):42-5.
  14. Lie LY, Angelique L, Cheong E. How do male and female students approach learning at NUS. *CDTL Brief*. 2004;7(1):1-3.
  15. Brassard C. Are learning patterns different on Mars and Venus. *CDTL Brief*. 2004 Jan;7:5-6.
  16. Grollino E, Velayo RS. Gender Differences in the Attribution of Internal Success among College Students.
  17. Wehrwein EA, Lujan HL, DiCarlo SE. Gender differences in learning style preferences among undergraduate physiology students. *Advances in physiology education*. 2007 Jun;31(2):153-7.