ORIGINAL ARTICLE

GENDER DIFFERENCES IN LEARNING STYLE PREFERENCES OF FIRST YEAR MEDICAL STUDENTS

Raghuveer Choudhary, Puja Dullo*, RV Tandon*

Department of Physiology Dr. S. N. Medical College Jodhpur, *Government Medical College Kota, India

Background: Learning style is defined as the manner and the conditions under which learners most efficiently and effectively perceive, process, store and recall what they are attempting to learn. Do men and women learn differently or have different preferred ways of learning? To address this concern, faculty members should understand their students' learning style preferences. We are interested in developing teaching approaches to address the learning needs of all of our medical students. To better understand our learners and their learning style characteristics, we administered Flaming's VARK questionnaire for assessing sensory modality. **Methods:** Participants in this study consisted of 1st year medical students at Government Medical College, Kota, India. A total of 155 students completed the questionnaire (59 female and 57 males). The VARK questionnaire was used to identify one facet of student learning styles, the sensory modality by which they prefer to take information. **Result:** Males (92.98%) and females (76.27%) preferred information to reach them via multiple sensory modalities. In addition only 15.52% of all students (6.25% males and 23.75% females) preferred using a single sensory modality for information intake. There was a significant gender difference in the percentages of males and females students who preferred multimodal or unimodal styles of information presentation ($p<0.05$). Some students preferred two modes (32.07% male vs 26.66% females), some students preferred three modes (47.16% male vs 40% female), and some students preferred four modes (20.75 male vs 33.33% female). There were no gender differences in the percentage of males and female students who preferred bi-, tri-, or quadmodal styles of information presentation ($p>0.05$). **Conclusion:** Although both males and females preferred multimodal learning but in different degree. Significant variation between the genders were revealed ($p<0.05$). As teachers, we need to assess and understand how to reach all students by understanding how to present the information in multiple modes. We can help students more effectively; both in and out of the classroom, if we are aware of their learning style.

Keywords: Learning styles, gender difference, medical students

INTRODUCTION

Do men and women learn differently or have different preferred ways of learning? Are there male and female preferences in learning styles rooted in evolutionary biology or overwhelming social differences? Why should we ask these questions anyway? We ask these questions because the answer may dramatically alter the ways in which we teach?

Faculty members must have content knowledge, pedagogical knowledge, and knowledge of the learner and his/her characteristics to be effective teachers. Most university faculty members have detailed knowledge of subject. However, obtaining knowledge of the learner and his/her characteristics is a vastly underutilised approach to improve classroom instruction.

To address this concern, faculty members should understand their students' learning style preferences. Learning style is defined as the manner in which and the conditions under which learners most efficiently and effectively perceive, process, store and recall what they are attempting to learn.[1] The field of learning style is quite complex. More than 70 different learning styles models have been identified in a review.[2] Gender is among a number of factors that affects students learning style. (Others include age, academic achievement, brain processing, culture and creative thinking).

Normally students perceive the information by sensory modality. Major sensory modalities have been defined as: Visual (V), Aural (A), Writing/Reading (R) and Kinesthetic (K) collectively known as VARK. VARK categorises student learning based on the neural system that is preferred when receiving information.[3]

We are interested in developing teaching approaches to address the learning needs of all of our medical students, male and female. To better understand our learners and their learning style characteristics, we administered Flaming's VARK questionnaire[4] for assessing sensory modality.

MATERIAL AND METHODS

Participants in this study consisted of 1st year medical students at Government Medical College, Kota. A total of 155 students completed the questionnaire (59 female and 57 males).

The VARK questionnaire developed by Fleming[4] was used to identify one facet of student learning styles, the sensory modality by which they prefer to take information. We administered the

questionnaire as a hard copy that was completed in classroom.

Students were allowed to choose multiple answers per item to adequately describe their preferred response(s) to the situation presented. The total number of student responses was tallied for each of the four sensory modalities (V, A, R and K) and for all possible combinations of modalities (e.g., VA, VRK etc.). The scoring algorithm on the VARK web site was then applied to identify each student's modality preferences.

The number of students who preferred each mode of information presentation was divided by the total number of student responses to determine the percentage of students in each category. A χ^2 analysis was performed to determine if significant gender differences exist for each of following situation: i) multimodality and unimodality preferences between males and females (Figure-1), ii) Quad, tri- and bimodality preferences between males and females. (Figure-2), and iii) Unimodal preferences between males and females.

RESULTS

Figure-1A shows the percentage of male and female students who preferred multimodal and unimodal styles of information presentation. Males (92.98%) and females (76.27%) preferred information to reach them via multiple sensory modalities. In addition only 15.52% of all students (M: 6.25%, F: 23.75%) preferred using a single sensory modality for information intake. Of the students who preferred unimodal presentation of information (either A, R, or K) some students preferred simple A (1.75% male vs 6.78% females), Single R (3.50% males vs 1.69% females) or single K (1.75% Male vs 15.25% females) modalities. There was a significant gender differences in the percentages of males and females students who preferred multimodal or unimodal styles of information presentation ($p<0.05$) (Figure-1B).

Figure-2A shows the percentage of male and female students, who preferred two, three or four modes of information presentation. Some students preferred two modes (32.07% male vs 26.66% females). Some students preferred three modes (47.16% male vs 40% female), and some preferred four modes (20.75 male vs 33.33% female).

There were no gender differences in the percentage of males and female students who preferred bi-, tri-, or quadmodal styles of information presentation ($p>0.05$) (Figure-2B).

Figure-3A shows the breakdown of bi-, tri-, and quadmodal preferences by gender of the male and female students who showed a preference for two modes of information processing. Some students preferred the combination of modes A and R (3.77% male vs 6.66% female). Some students preferred R and K (3.77% male vs 6.66% female) and some students preferred V and K (0% male vs 2.22% female). Of the male and female students who preferred three modes of information processing, some students preferred the combination modes, A, R, and K (26.41% male vs 17.77% female) some students preferred V, A and R (5.66% male vs 2.22% female). A number of male and female students were quad modal, preferring all four modes of information processing. (20.75% male vs 33.33% female). There were no significant gender differences in the specific multimodal preferences. (Figure-3B) ($p>0.05$).

Of all the male learners, the percentage whose learning style preference contained V somewhere in their profile (whether it was their unimodal choice or contained within one of the male multimodal combination, such as VA, VK, VAK, VAR, VRK or VARK) was 50.88%. In contrast, 44.07% of females preferred V in their modality mix. Similarly percentage of males and females preferred A in their modality mix (54.39% vs 71.19%), either as a unimodal preference or part of a multimodal combination. R was preferred by 71.92% of male of 57.63% of females in their modality mix; and K was preferred by 85.96% of males to 84.75% of females in their modality mix. Although none of these differences reached statistical significance, these differences need further investigations.

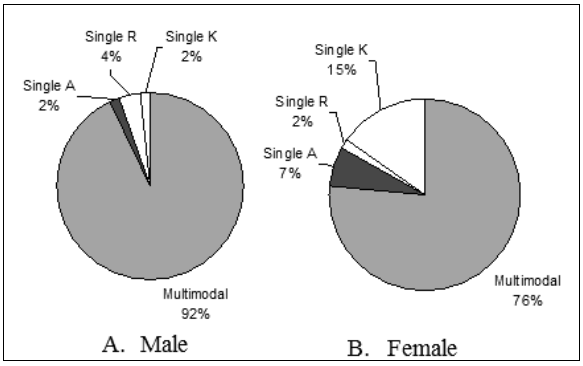

Figure-1: Learning preferences of male, and female students (Values rounded to nearest whole digit)

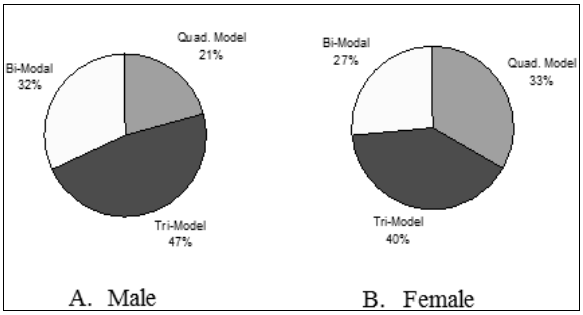

Figure-2: General multi-modal learning preferences among male and female students

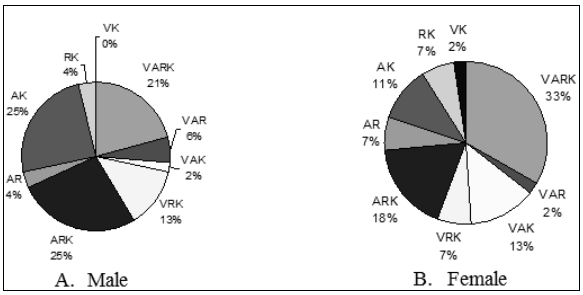

Figure-3: Specific multimodal preferences among male and female students

DISCUSSION

The purpose of the study was to assess gender differences in learning style preferences among undergraduate physiology students of medical college Kota. The responses were tallied and assessed for gender differences in learning style preferences. Importantly 92.98% males only 75.27% of females preferred multiple modes of presentation. Thus in contrast of females, the majority of males preferred multiple modes of information presentation. Male students may adjust to different teaching styles faced in a day or they may opt in and out of alternative strategies. Such as being visual in cardiovascular physiology and reading/writing in respiratory physiology, for example.[3]

On comparing single mode of information males prefers 7% to females 23.72%. So as compared to males, the females preferred information to be presented in a single mode. It shows a significant variation between gender ($p<0.05$).

Although both males and females preferred multimodal learning, yet in a different degree. Significant variation between the genders were revealed ($p<0.05$).

The knowledge of student preferred learning style is vital if we as educators are to provide tailored strategies for individual students.[3] Knowing students preferred learning style also helps to overcome the predisposition of many educators to treat all students in a similar way as well as motivate teachers to move from their preferred modes to using others.

For example, there is a trend in University teaching to instruct all students in the same way (i.e., a straight lecture format). Educators use this lecture format because of the relative ease of information passing, the need to cover the content, a long history of traditional lecturing and perhaps due to their own preferences in learning. The results of the VARK questionnaire should convince teachers to use multiple modes of information presentation. This may require instructors to stray from their own preferred modes of teaching and learn to use a variety of styles, which will positively affect learning. By using a variety of teaching approaches, teachers will reach more students because of the better match between teacher and learner styles.

Instructors can also use the self-reported VARK results from each individual class to become aware of the distribution of information intake preferences among each class and to adjust their method of information delivery to correspond with these preferences. These adjustments would benefit both male and female learner. For example, V-type learner can be targeted by the presence of models anddemonstrations.[5] A-type learner can be reached through discussion during peer instruction,[6,7] collaborative testing,[8,9] debate,[10] games,[11,12] and answering questions[10]. Manipulating models[5] and role playing[14] can satisfy K-type learners.

When instruction is undergraduate courses matched student's learning style preferences, students achieved higher scores than when mismatched.[15] Rochfored[16] found that using learning style responsive material to instruct remedial writing students at an urban community college resulted in significantly higher achievement. Miller[17] found that both student examination scores and students attitude toward learning scores were significantly higher when presentation was matched with student learning styles.

An opposing view that exists in the literature asks whether it is most advantageous to teach primarily using a mode that matches an individual's preferred learning style or whether a deliberate mismatch may produce stronger results for the learner. Grasha[18] argued that an environment in which delivery of the material is matched to the learner's preferred style would eventually bore the student, causing the learner to disengage. A deliberate mismatch could prevent foredoom and structure an individual to grow and learn. This was supported by research that showed that even individuals with strong learning style preferences preferred a variety of teaching approaches to avoid boredom.[19] Kelly and Tangley[20] showed that students with 'low' levels of learning activity actually learned more when presented first with their least preferred material and resources. It is important to know that the efficacy of mismatching as a primary strategy for improving student learning outcomes has not been shown.[4] Mismatching is suggested as an occasional teaching strategy employed to stimulate interest, and not as an alternative for matching.

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.[21] In addition, males are more achievement oriented, while females are more socially and performance oriented.[22] The genders also differs in their beliefs about what is most important to student learning

with females ranking social interaction with other students.[23] Furthermore, males are likely to attribute their success in the classroom to external causes, such as teaching, whereas females generally see their success are being directly related to their efforts in the classroom.[24] This suggest that males tends to be more externally focused, while females are introspective and self-critical.

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 (i.e., separate science classes for male and females). This study asserts that male and females have difference preferences in learning style. As suggested by Lie *et al*[21] this actually supports mixed gender classrooms and study groups to allow both genders to learn from each other.

CONCLUSION

Students learning style preferences can be determined by the use of theVARK questionnaire, which assist both the learner and educator. There is a significant difference in learning styles preferences of male and females. As such it is the responsibility of the instructor and the students to be aware of student learning style preferences to improve learning. As teachers, we need to assess and understand how to reach all students by understanding how to present the information in multiple modes. We can help students more effectively; both in and out of the classroom. If we are aware of their learning style and can help them in determining their preferences. As a student, it is vital to be self aware of preferences to adjust study techniques to best fit each student, even when the information and instruction provided does not match the preferred style.

REFERENCES

1. James W, Gardner D. Learning styles: implication of distance learning. New Dir Adult Conti Educ1995;67:19–32.
2. Coffield F, Moseley D, Hall E, Ecclestone K. Learning Styles and Pedagogy in Post-16 Learning: a systematic and Critcal Review. London: Learning Skills and Research Center, 2004.
3. Fleming ND. I'm different not dumb: Modes of presentation (VARK)in the tertiary class room. In: Research and Development in Higher Education, edited by Zelmer A. Canberra, Australia: Proceedings of the 1995 Annual Conference of the Higher Education and Research Development Society of Australia,1995.p.303–18.
4. Fleming ND. VARK a guide to learning styles (online). Availabale at http://www.vark-learn.com/english/page.asp?p=questionnaire.
5. Chan V, Pisegna JM, Rosian RI, Dicarlo SE. Constuction of a model demonstrating neural pathways and reflex arcs. Adv Physiol Educ1996;16:14–42.
6. Cortright RN, Collins HL, Dicarlo SE. Peer instruction enhanced meaning learning: ability to solve novel problems. Adv Physiol Educ 2005;29:107–11.
7. Rao SP, Dicarlo SE. Peer instruction improve performance on quizzes. Adv Physiol Educ 2000;24:51–5.
8. Cortright RN, Collins HL, Rodenbangh DW, Decarlo SE. Student retention of course content is improved by collaborative-group testing. Adv Physiol Educ 2002;27:37–41.
9. Rao SP, Collins HL, Dicalo SE. Collaborative testing enhances student learning. Adv Physiol Educ 2002;16:37–41.
10. Scannapico FA. Formal debate: An active learning strategy. J Dent Educ 1997;61:955–61.
11. Howard MG, Collins HL, Dicarlo SE. "Survivor" torches "Who Wants to be a Physician" in educational games ratings war. Adv Physiol Educ 2002;26:30–7.
12. Bailey CM, Hsu CT, Diarlo SE. in Educational puzzles for understanding gastrointestinal physiology. Adv Physiol Educ 1999;21:1–18.
13. Dicarlo SE, Collins HL. Colored letters: a tool to increase class participation in a large classroom. Adv Physiol Educ 2001;25:143.
14. Kuipers JC. Clemens DL. Do I dare? Using role play as a teaching strategy. J Psychosoc Nurs Ment Health Serv 1998;36:12–7.
15. Mangino C, Griggs S. Learning Styles Model Research: Who, What, When, Where and So What the Dunn and Dunn Learning Styles Model and Its Theoretical corner stone. Edited by Dunn R, Griggs S. New York, St. John's University.2003.
16. Rochford R. Improving academic performance and retention among remedial students. Community College Enterpr 2004;10:23–36.
17. Miller JA. Enhancement of achievement and attitudes through individual learning-style presentations of two allied health courses. J Allied Health 1998;27:150–6.
18. Grasha A. Learning styles: the journey from Greenwich Observatory (1769) to the college classroom (1984). Impr College Teach 1984;32:46–53.
19. Gregorc A. Style as a symptom: a phenomenological perspective. Theory Practice 1984;23:51–5.
20. Kelly D, Tangney B. Matching and Mismatching Learning Characteristics With Multiple Intelligence Based Content. Amsterdam: Proceedings of the 12th International Conference on the Artificial Intelligence in Education.2005. p.354–61.
21. Lie LY, Angelique L, Cheone E. How do male and female students approach learning at NUS? CDTL Brief 2004;7:1–3.
22. Chang WC. Learning goals and styles by gender a style of NUS students. CDTL Brief 2004;7:4–5.
23. Brassasd C. Are learning patterns different on Mars and Venus? CDTL Brief 2004;7:5–6.
24. Grollino E, Velayo RS. Gender Differences in the Attribution of Internal Success among College Students. Philadelphia, PA: Annual Convention of the Eastern Psychological Association, 1996. p.1–12.

Address for Correspondence:

Dr. Raghuveer Choudhary, Department of Physiology, Room No. 126, Dr. S. N. Medical College, Jodhpur-342001, India. **Cell:** +91-982-9216643

Email: drraghu74@yahoo.com