

Original article:

Information reception by millennial medical students- a study on learning style preferences

Beula Subashini¹, Rajan Sundaresan², John Antony Jude Prakash³, Balaji Veeraraghavan⁴, Minnie Faith⁵ *

¹ Associate Professor, Department of Clinical Microbiology, Christian Medical College and Hospital, Vellore

² Associate Professor, Department of ENT, Christian Medical College and Hospital, Vellore

^{3,4} Professor, Department of Clinical Microbiology, Christian Medical College and Hospital, Vellore

⁵ Professor of Biochemistry and Head, Medical Education Department, Christian Medical College and Hospital, Vellore

*Corresponding author

Abstract

Background: Learning styles differ with individuals and this paper aims to analyse and understand the different styles used by medical students of the millennial generation at a 100-year-old medical college in South India. This would enable medical teachers to develop appropriate teaching strategies.

Materials and Methods: Study includes 100 medical students with 59% being female students and 41% comprising male students who are undergraduate medical students. This is a descriptive questionnaire-based observation study. Learning style preferences of undergraduate medical students attending Microbiology training were assessed by a self-administered VARK questionnaire.

Results: 88 % of the students preferred unimodal and 11% of the medical students preferred bimodal learning. In the unimodal group 21% preferred Visual, 29% Aural, 12% Reading style and 38% Kinaesthetic mode of learning. Among the visual category females' students were 66% and males 34%, A- in the aural group females (66%) predominated compared to males(34%). R- read / W- write group female students (58%) preferred to like making lists and notes in all its formats in comparison to Males (42%). K-kinaesthetic mode of learning with practical exercises and hands on trial and error was the most preferred among the entire cohort (38%) was equally distributed among both the genders.

Conclusion: This study demonstrates that millennial medical students at our medical school are keen learners through hands-on training, which are key attributes and essential to be empathetic and well-trained medical professionals. The results enabled us to understand learning styles preferred by this generation so as to develop appropriate teaching strategies.

Key words: VARK, learning styles (LSs), Learning preference, Millennials

1 Introduction

Teaching tomorrow's doctors today is a challenge to teachers¹ trained with "yesterdays" methods. Medical teaching in the 18th century as espoused by Osler was bedside teaching and "clerkship" as an important method for over a century. Added to this in the 19th century was Flexner's inclusion of biomedical sciences and the need for evidence-based teaching incorporated into the medical curriculum for a strong bio-medical science foundation such as microbiology and pathology. The main method of information exchange that happened during medical training in the early 20th century was predominantly 'pedagogic' in nature. Large textbooks and journal collections remained the repository of information for learning. With the advent of internet, social media and boom of information available via the internet in 21st century, learning is dynamic and open, hence

decision making on choosing the right source of information becomes crucial for students. Medical students are often overwhelmed² or overloaded by the amount of knowledge they need to acquire during their career to become a medical professional.

Most students are unaware of methods used for effective learning to improve their knowledge and retention abilities³. Learning style is the learner's preferences related to the differences of each individual's educational and instructional activities. A learning style is the method by which a learner discerns and translates information into practice⁴. Understanding the way students learn⁵, helps in selection of the instructional strategies best suited to them^{6,7}. Better comprehension by a budding medical student is enhanced by various tools and the teaching learning methods used to provide education⁸. Students' aptitude to learn and perform improves better when instruction is attuned to students' learning style preferences⁹. Tools such as Kolbe indicator, Meyer Brigg Indicator, Vermunt's inventory, Flemming's (VARK) questionnaire are designed to understand the learning style preferences of individuals. The visual, auditory, reading/writing, kinaesthetic (VARK) questionnaire developed by Fleming is designed based on four sensory modalities preferred for learning^{10,11}. Every student prefers to learn according to their own predominant learning style, making it vital for a teacher^{12,13} to address this diversity among students.

Teaching clinical microbiology to medical students has remained the same over the century and has predominantly been a combination of classroom lectures and lab based demonstration of organisms and their properties of growth and identification. Microbiology as a subject has been perceived as difficult and irrelevant clinically among learners and this remains a challenge even today^{14,15}. Hence, we attempt to identify the lacunae and address these issues among the millennial medical student learners at our institution. We propose to study how medical students receive information for learning via learning style preferences, create awareness of and motivate students to adopt appropriate learning modalities to enhance their academic performance.

2. Materials and Methods:

This prospective study was conducted in the Department of Microbiology and Department of Medical education between September 2016 to December 2016. Research and Ethics Committee approval was obtained prior to the start of the study from institution (IRB MinutesNo:10185). A total of 100 para-clinical second year undergraduate medical students attending regular microbiology classes were recruited in the study after obtaining written informed consent on a voluntary basis. Informed consent was taken from all students. Prior to administration of VARK questionnaire the students were assessed to identify their awareness to VARK following which the VARK questionnaire

(<http://vark-learn.com/wp-content/uploads/2014/08/The-VARK-Questionnaire.pdf>)

(version 7.8), developed by Neil Fleming at Lincoln University in New Zealand (Copyright permission obtained from the author) was administered to all students to elicit their learning preferences. The VARK questionnaire administered consists of 16 Questions with four choices each and students were instructed to answer with single or multiple responses. VARK questionnaire is designed to portray real life situations with 4 responses that represents the preferred sensory style. The sensory style with highest score is considered as the learning style preferred predominantly by the student. Data was summarised using mean (SD) or median (IQR) for continuous variables depending on normality and categorical data were expressed as frequency and percentage. Analysis was performed using the STATA IC/13.1 (SPSS, Chicago, USA).

3. Results:

A total of 100 second year medical students in the medical school who were all from across the country with births between 1995-2000 were included in the study. The female students represented 59 % of the total students while 41 % of them were males.

3.1. Awareness about VARK

The student's awareness about VARK learning preferences were assessed with five questions and their yes or no answers were recorded (ref Table). Results show that only 5 % of the students were familiar with VARK and only 2% were familiar with VARK learning strategies.

Questions	Yes (%)	No (%)
Are you familiar that learning styles exist?	74.75	25.25
Are you familiar with VARK learning style?	5.05	94.95
Are you familiar with VARK learning strategies	2.02	97.98
Are you familiar with your own learning style?	64.65	35.35
Are you familiar with learning strategies of different types of learners in your group?	42.42	57.58

3.2. VARK scores based on Gender

Based on the VARK scores, categorization of preferred learning styles among males and female students in our cohort showed that, V- visual cue for learning was preferred by 21% of students of which females were 66% and males 34%, A- in the aural group (29 %) females (66%) predominated compared to males (34%), which reflected that females receive information through a strong aural preference for learning through talking, discussions, stories & chatting¹⁶.

Among the R- read and W- write group (12%) female students (58%) preferred to like making notes in all its formats in comparison to Males (42%). K-kinaesthetic mode of learning with senses, practical exercises, examples, cases, hands on trial and error was the most preferred among the entire cohort (38%) and was distributed equally among both the genders.

Overall the female students scored higher in the categories of aural, read & write and visual, but equally preferred the kinaesthetic cue for learning as compared to males. (Fig: 1).

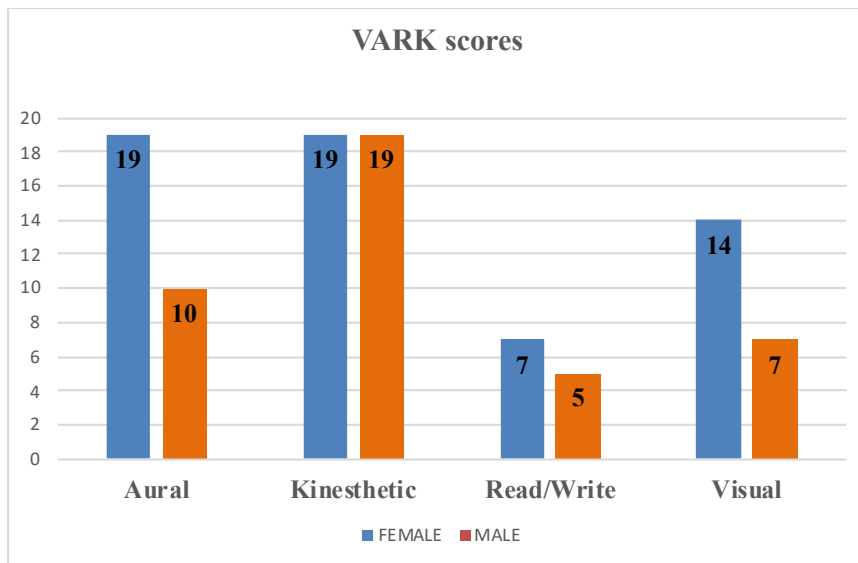


Fig 1: Gender preferences among learning styles

V-Visual, A- Aural, R/W-Read and Write, K-Kinesthetic

3.3 . Mode of Preferences

Of the 100 medical students who participated in the study, 88 students preferred unimodal method of learning, 11 students preferred bimodal and one student preferred all four methods of learning. However, there were no students with trimodal preference. Among those who preferred a single mode of learning, 21% preferred visual, 29% aural, 12% reading style and 38% preferred kinaesthetic mode of learning (Fig: 2) which seemed to be the most common method preferred by most of the students.

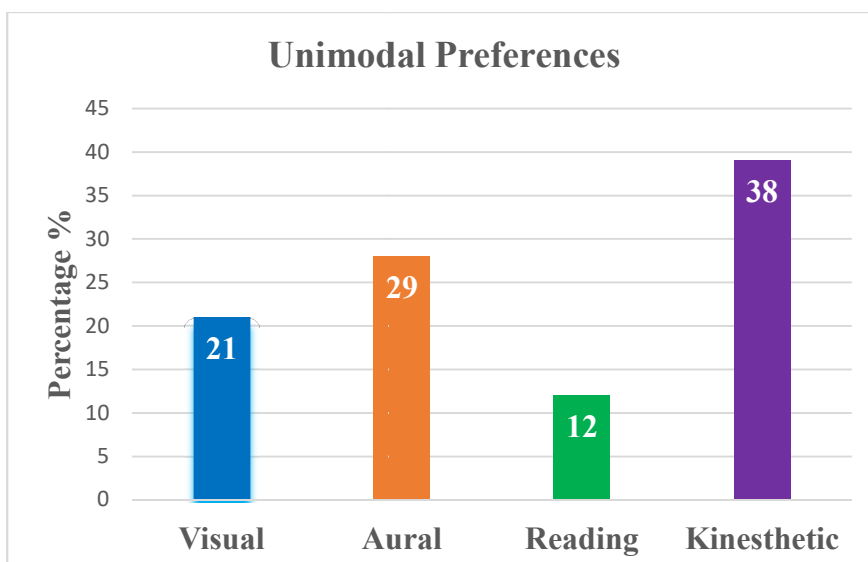


Figure 2: Unimodal learning style preferences; V -21 %, K-38 %, A-29 % and R-12 %

4. Discussion

Learning style preference study in this cohort of millennial medical students based on the VARK model shows that they prefer more Kinaesthetic (38%) method, in comparison to Visual (21 %), Aural (29%) and Reading & writing (12 %). It was interesting to note that most of the medical students preferred a unimodal learning style and read/ write style is least preferred among millennials. These unimodal preferences highlight a need for focused teaching and encouraging learning in a student through preferred learning mode. This could be an essential component of focused teaching in modern medical education.

Teaching microbiology has been an important aspect of medical education since the 'germ theory of causation of disease' was introduced. The overarching medical advance of the 19th century was the discovery of microbial cause of disease which has revolutionised medical practice in general. Hence teaching microbial pathogenesis of disease is very essential, and doing this in a way the student best comprehends and correlates learning with disease pathology is of paramount importance¹⁷.

The generation born between 1981 and 2000 at the end of the millennium are called Millennials. Millennials as a generation are data driven and are bombarded with lists, facts, audio, videos and have been shaped by the forces of globalization. Technology, particularly as a communication tool is an innate and intimate part of everyday life for Millennials. They have grown up in a world with unprecedented and instant access to data, in their pockets and at their fingertips. These reasons could contribute to learning styles being different among millennial students than the previous generations. Learning style choices and their outcomes have been emphasized in literature over more than two decades. VARK as a model has been studied and applied in this study because of its ease to understand different styles and methods used to teach. Kinaesthetic method of learning was most common method preferred among both males and females. Kinaesthetic learners have characteristics that describe the millennials in general wherein they have short span of attention for listening and learn better when experienced hands on, as described by Murphy et al¹⁸.

Literature describes that variations in learning styles between genders do exist¹⁹, males being more achievement oriented while females performance oriented²⁰. Understanding this association between gender preferences among learning style and teaching style is very pertinent and does have implications for practice²¹. These differences in learning style preferences between males and females need to be addressed and becomes the responsibility of the teacher and student for better academic performances, however our study demonstrates that both genders equally prefer the kinaesthetic mode of learning.

Kinaesthetic learners are those who empathize, feel, touch and interact with their surroundings and are not interested in visual and aural methods which entail being passive in lectures. Wolfman and Bates et al view that kinaesthetic learning style improves students' learning motivation²². It is important to supplement formal teaching with informal learning and not just projecting information over screens which is only a representation of the information that is available in various sources.

This study emphasises the need to engage these students in a meaningful manner through group discussions, problem solving seminars and real life situations. Groover et al focused on various aspects of learners such as distinct roles played by each during planning and execution, motivation and involvement. Importance was given to creativity, interaction and coordination and time management skills in a peer teaching and fish-bowl interactive method which was highly appreciated by learners. Oral feedback given by the medical students at

the end of this study emphasized that it improved the medical students' awareness of VARK styles and made them realize the innate potential for receiving information in a particular sensory mode to enhance learning.

Limitations of the study include complete reliability of VARK in projecting learning styles, as there is lack of substantial evidence on those who use learning styles as part of their learning strategies²³. Our study was a reflection of the millennial students at our centre and does not represent a worldwide scenario, hence an inclusion of larger sample size and multicentric data could provide better understanding of learning styles preferences. Follow up of these students to final year to understand the changes in their learning style preferences was not possible which adds to the limitations.

5 Conclusion:

Microbiology learning by a millennial medical student has diverse challenges, addressing this diversity in receiving information would enhance the learning of the millennial medical student. This study gives a snapshot of the learning style preferred by the millennial generation learners at our institution, this would enable us to develop appropriate teaching strategies that are tailored to students' need based on their preferred learning style.

6 Acknowledgements

We thank Mahasampath Gowri for her statistical assistance. The Study was funded by the fluid research grant of Christian Medical College, Vellore. This project is done as part of the Advanced Course in Medical Education (ACME) course at the MCI Nodal Centre and Department of Clinical Microbiology, Christian Medical College and Hospital, Vellore.

References

1. A.K G. Organizing an Effective Continuous Medical Education Session. JAPI July 2008;56:533-38.
2. Kashinath G, Anjali S, a S. Learning by Teaching: Role of Peer Assisted Learning in medical education. J Contemp Med Edu 2019;9:17.
3. Augustin M. How to learn effectively in medical school: test yourself, learn actively, and repeat in intervals. Yale J Biol Med 2014; 87:207-12.
4. Sadler-Smith E. Learning styles and instructional design. Innovations in Education and Teaching International 1996;33: 185-93.
5. Vishrutha K.V PKG, Chaitra U, Vandana. Assessment of learning style preferences among students Indian Journal of Clinical Anatomy and Physiology; 3(1):101-105 2016.
6. Tanner K, Deborah Allen. Approaches to Biology Teaching and Learning: Learning Styles and the Problem of Instructional Selection—Engaging All Students in Science Courses. Cell Biology Education 2004;3.4 197-201.
7. Mamata Vishnu H, Sarita Vijay A, Parduman S, et al. Biochemistry handouts covering all lecture topics as study guide to focus during exam preparation in first year medical undergraduates in India. J Contemp Med Edu 2013;1:33.
8. Platt MW, Obenshain S, Friedman M. Integration of computers into the medical school curriculum: An example from a microbiology course. Medical Teacher 1994;16:9-15.
9. Breckler J JD, Ngo H. . Learning styles of physiology students interested in the health professions. Adv Physiol Educ 2009;33:30-6.

10. Khanal L SS KS. Exploration of preferred learning styles in medical education using VARK modal. Russ Open Med J 2014;3 305.
11. Saran R KS, Pentapati KC. Assessment of learning preferences among dental students using Visual, Aural, Read-Write, Kinesthetic questionnaire .An institutional experience. Journal of Dental Research and Review 2015 1:10-12.
12. Jwalant E Waghmare PJW, Bharat R Sontakke. Competencies for Medical Teacher Journal of Education Technology in Health Sciences 2016;January-April, 3(1):2-3
13. Rita S. Role of API in Promoting Medical Education. JAPI July 2002;50.
14. Chamberlain NR, Stuart MK, Singh VK, et al. Utilization of case presentations in medical microbiology to enhance relevance of basic science for medical students. Med Educ Online 2012;17.
15. Fraser Williams R. Teaching of Microbiology to Medical Students. Journal of Biological Education 1967;1:325-35.
16. Severiens SE, Ten Dam GTM. Gender differences in learning styles: A narrative review and quantitative meta-analysis. Higher Education 1994;27:487-501.
17. Ciraj AM, Vinod P, Ramnarayan K. Enhancing active learning in microbiology through case based learning: experiences from an Indian medical school. Indian J Pathol Microbiol 2010;53:729-33.
18. Murphy RJ, Gray, S. A., Straja, S. R., & Bogert, M. C Student learning preferences and teaching implications. :Educational methodologies. Journal of Dental Education 2004;68 (8), 859-866.
19. Wehrwein EA, Lujan HL, DiCarlo SE. Gender differences in learning style preferences among undergraduate physiology students. Advances in Physiology Education 2007;31:153-57.
20. WC C. Learning goals and styles by gender—a study of NUS students. CDTL Brief 2004.;7: 4 –5.
21. Laird T, Garver, A. K. and Niskodé, A. S. 2007. “Gender gaps: Understanding teaching style differences between men and women.”. Paper presented at the Annual Meeting of the Association for Institutional Research, 2–6 June, in Kansas City, MO.
22. S A Wolfman RAB. Kinesthetic learning in the classroom. Journal of Computing Sciences in Colleges 2005;21:203-5.
23. ND. F. The Case Against Learning Styles: “There Is No Evidence . . .” (online). <http://www.varklearn.com/documents/The%20Case%20Against%20Learning%20Styles.pdf> (1 May 2014).