Original Article

The preferred learning styles utilizing VARK among nursing students with bachelor degrees and associate degrees in China

Hong-rui Zhu[1]
Hui Zeng[2]
Hua Zhang[1]
Hong-yu Zhang[1]
Feng-jing Wan[1]
Hong-hua Guo[1]
Cai-hong Zhang[1]

Keywords
Learning style; VARK; Bachelor degree nursing students; Associate degree nursing students

Submitted
January 27, 2018

Accepted
May 3, 2018

Abstract

Objective: This study aimed to determine the differences in learning style preferences among bachelor degree nursing students at Central South University and associate degree nursing students at the Vocational Health School in China.

Methods: This study was a cross-sectional survey using the Chinese version of the VARK questionnaire to assess preferred learning styles: 159 enrolled bachelor degree nursing students and 199 enrolled associate degree nursing students completed the questionnaire with a response rate of 96.8%.

Results: The bachelor degree nursing students tend to prefer a multimodal learning style (58.49%), which significantly differed from that of associate degree nursing students (45.77%). The kinaesthetic modality was the predominant unimodal learning style among the bachelor degree and associate degree nursing students (18.20% and 33.67%), and the read-write modality was the least popular modality (2.5% and 4.02%).

Conclusion: There are both differences and similarities between the learning style preferences of bachelor degree and associate degree nursing students. Educational background is one of the most critical factors that influence the learning style preference of nursing students. This finding may be necessary and beneficial for carrying out future curricula reform. In addition, further comprehensive research should be conducted to examine the relationships between learning style preferences and academic performance, as well as learning style preferences and teaching methods.

Corresponding author
Cai-hong Zhang
https://orcid.org/0000-0003-4451-5199
E-mail: zhutoumeiruirui@163.com

DOI
http://dx.doi.org/10.1590/1982-0194201800024

How to cite:
Zhu Hong-rui, Zeng Hui, Zhang Hua, Zhang Hong-yu, Wan Feng-jing, Guo Hong-hua, Zhang Cai-hong. The preferred learning styles utilizing VARK among nursing students with bachelor degrees and associate degrees in China. Acta Paul Enferm. 2018;31(2):162-9.

[1]International Nursing School of Hainan Medical University, 3 Xueyuan Road, Chengxi District, Haikou, 571199,Hainan, China.
[2]Xiangya Nursing School of Central South University, 172 Tongzipo Road, Yuelu District, Changsha, 410013 , Hunan, China.

Conflicts to interest: none to declare.

Introduction

Learning is an interactive process and is the product of student and teacher activity within a learning environment.[1] Changes in disease patterns, the acceleration of the aging population and the internationalization of nursing education make it difficult for traditional nursing education to accommodate the new education environment. To meet these challenges, there has been a shift from the traditional teacher-centred approach to the newer learner-centred approach.[2] In this situation, adopting new methods of teaching and learning to varying degrees is important. Learning styles have been widely believed to benefit both teachers and students,[3] in that teachers can tailor pedagogy to match a student's learning style, which is conducive to potential learning abilities. Being aware of their individual styles can help students find appropriate ways to learn and benefit from these styles in their future professional journey.[4]

According to Sarun, the learning style is defined as "the method in which learners perceive, process, interpret, organize and think about information".[5] Many scholars have devoted to developing a series of instruments to measure an individual's learning style. The VARK questionnaire is one of the most popular instruments with adequate reliability and satisfactory validity. The final version of the VARK questionnaire was reviewed and approved by the original creator of the VARK learning styles inventory (Dr. Neil Fleming) and his feedback was incorporated into this tool.[6] The acronym VARK stands for Visual, Aural, Read/write, and Kinesthetic sensory modalities. The learning style can be divided into two categories. Unimodal learners have only one dominant learning preference and can be classified into four styles, V, A, R/W, and K. Visual (V) learners prefer to observe the practice of others and use visual resources to perceive information. Pictures, videos, flow charts, and diagrams are their favourites and of great value to them. Aural (A) learners enjoy attending tutorials and sessions, listening to tape recorders, hearing stories from others, talking about problems and exchanging ideas with classmates to acquire information. The Reader/Writer (R/W) learners like to acquire and integrate information by reading textbooks and writing down the key details. They review their notes regularly. Finally, kinaesthetic (K) learners prefer to learn information through practice and self-experience. The "multimodal learners" have a balanced set of learning preferences, including the bimodal, trimodal and quadomal.[7]

At present, VARK has been used widely in various fields of medical education.

Many factors influence a student's learning style including the gender,[8-11] age,[12] geographical background,[13] and educational major[14] among other factors. The level of education is also considered to be one factor that affects the learning style. The previous studies focused on investigating and analysing the differences between preclinical and clinical, undergraduate and postgraduate students. The study conducted by Samraakoon et al. among medical undergraduates and postgraduates in Sri Lanka showed that the majority of undergraduates had a multimodal learning style, while the majority postgraduate students shifted towards a unimodal learning style.[15] In China, few studies have been conducted to explore this phenomenon in the field of nursing education. In China, nursing education began comparatively late, and the education levels were diverse from secondary vocational education to doctoral education. A three-year associate nursing programme and a four-year baccalaureate nursing programme are the two major pathways for becoming a nurse in China. Hence, the purpose of this study was to explore the learning style preferences among students in an associate nursing programme and those in a baccalaureate nursing programme in China and to help teachers design teaching-learning strategies that match the learning style of students at various educational levels. These findings, in turn, may fully mobilize enthusiasm in students and may improve the learning efficiency and quality.

Methods

Design and Sample

This research was a cross-sectional study. Purposive sampling was used, and a total of 370 students in

Hunan, China, were enrolled in this study. Among the 370 questionnaires that were handed out, 358 questionnaires were completed, and 12 were discarded as incomplete. Hence, the final response rate was 96.8%. The final sample consisted of 159 students from Central South University and 199 students from the Vocational Health School, only 17 of whom were male. The ages of the students ranged from 15-24, and the mean age was (18.67±1.954); 216 students were from rural areas, and the rest were from the city; 114 students were an only child, and 244 students were not; 114 students served as the student leader, and 244 students did not; and 37 students' family economic status was good, 252 students' family economic status was fair and 69 students' family economic status was bad.

Data Collection

Data were collected from students during the second semester of the academic year from 2016-2017. Consent from the students was obtained for participation in the study and for filling out the questionnaire. Data were collected using a questionnaire composed of two questionnaires. The first questionnaire was designed to obtain the demographic information of the students, including the name, school, age, sex, nation, grade, geographical background, whether they were single or not, cadre or not, the parents' occupation, family economic status, academic records and other information. The second questionnaire was version 7.0 of the VARK questionnaire developed by Fleming and consisted of 16 questions, each with four options (A, B, C and D). Each option represents one category of the learning style, i.e., V (visual), A (aural), R (reading-writing), and K (kinaesthetic). The subjects could select one or more choices. The selection of one option indicated that the student was unimodal and mainly had one learning style preference, whereas the selection of two or more options indicated that the student was multimodal and had two or more learning style preferences. The questionnaire has been used by different studies all over the world, and its validity and reliability have been assessed. The Cronbach's alpha of the four major components of the VARK questionnaire is 0.85, 0.82, 0.84, and 0.77. The content validity of the Chinese version is 0.92 and the half reliability is 0.70. Copyright permission was obtained from the author to use the questionnaire. The questionnaires were completed when all of the students were in the classroom. Before filling out the questionnaire, the necessary information on the questionnaire was given by the investigator. It took students approximately 30 minutes to compete the two questionnaires. All of the informed consent and questionnaires were kept in a locked cabinet. The database from the questionnaires was kept on the researchers' password-protected computers.

Statistical Analysis

We used the SPSS18.0 statistical software to record and analyse the data. A p-value <0.05 (two-tailed) was defined as significant. The measured data were expressed as the means with standard deviations (SD). The enumerated data were presented as the total number, percentages and ratios. The t-test was used to compare the four subscale scores of VARK among bachelor and associate degree nursing students. A Chi-square analysis was used to compare categorical variables as well as the percentage of the learning style preference among bachelor degree nursing students and associate degree nursing students.

Results

Table 1 shows the comparison of the mean VARK scores among bachelor degree nursing students and associate degree nursing students. The highest mean score was kinaesthetic for both bachelor (5.47±2.753) and associate degree students (6.01±2.563). The lowest mean score was read-write for bachelor (3.65±2.253) and associate degree students (3.03±1.919). The mean visual score was significantly higher in the bachelor degree students than in the associate degree students. However, the mean score of kinaesthetic was significantly lower in the bachelor degree students than in the associate degree students.

Among all of the participants, one hundred seventy-five students preferred unimodal learning, and one

Table 1. Comparison of VARK scores among bachelor and associate degree nursing students

Educational background	Visual	Auditory	Read-Write	Kinaesthetic
Bachelor	4.81±2.745	4.99±2.306	3.65±2.253	5.47±2.753
Associate	4.09±2.335	4.67±2.120	3.03±1.919	6.01±2.563
t	7.176	1.794	8.131	3.582
p-value	0.008	0.181	0.005	0.059

hundred eighty-three preferred multimodal learning. There was a significant difference between undergraduate and associated degree students (P<0.05) as shown in table 2. Bachelor degree students preferred multimodal learning (58.49%), whereas associate degree students preferred unimodal learning (54.77%).

Table 2. Association between educational background and learning styles among nursing students

Educational background	Unimodal	Multimodal	χ^2	p-value
Bachelor	66(41.51)	93(58.49)	6.223	0.014
Associate	109(54.77)	90(45.23)		
Total	175(48.88)	183(51.12)		

Among unimodal learners, both bachelor and associate degree students showed a preference for the kinaesthetic modality above all others, followed by the auditory and visual modalities. The least preferred modality was the read-write modality. However, when the percentages of bachelor degree students who preferred auditory, read-write and kinaesthetic were compared to those of associate degree students, the values were greater in the associate degree students (11.1% vs. 10.7%, 4.0% vs. 2.5%, and 33.7% vs. 18.2%, respectively). In contrast, the percentage of associate degree students who preferred the visual modality was smaller than that of bachelor degree students (6.0% vs. 10.1%) as shown in figures 1 and 2.

Among the multimodal learners, more bachelor degree students preferred the quadmodal compared with the associate degree students (22.01% vs. 11.56%). Moreover, the percentage of the bi-

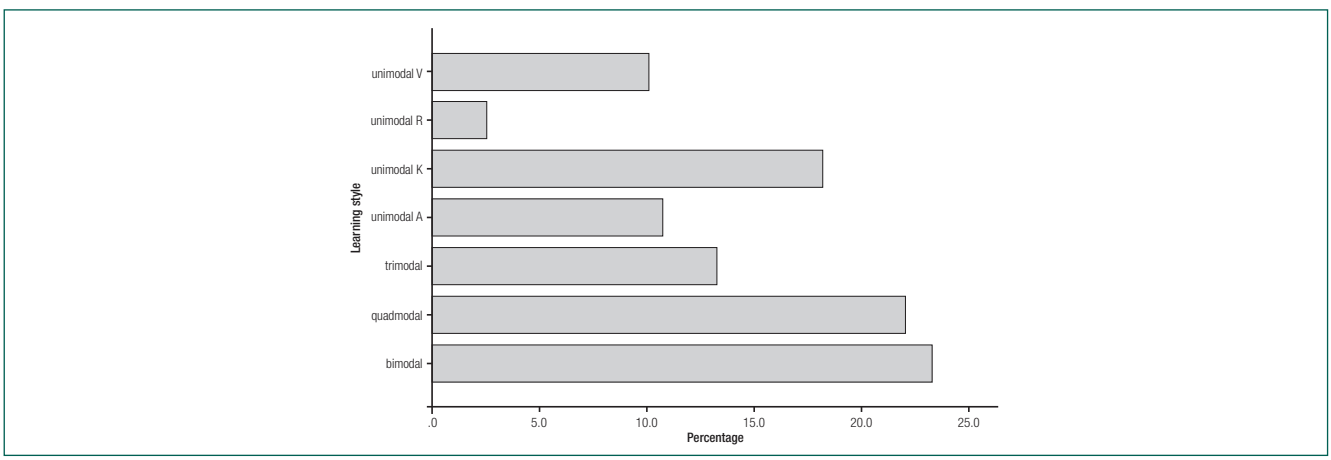

Figure 1. The preferred learning style among bachelor degree nursing students

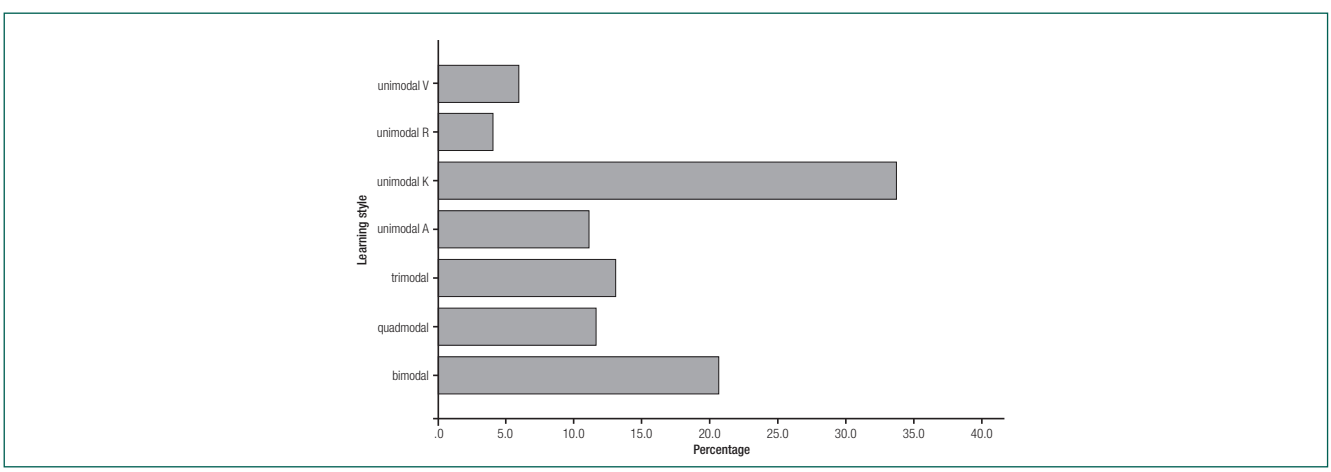

Figure 2. The preferred learning styles among associate degree nursing students

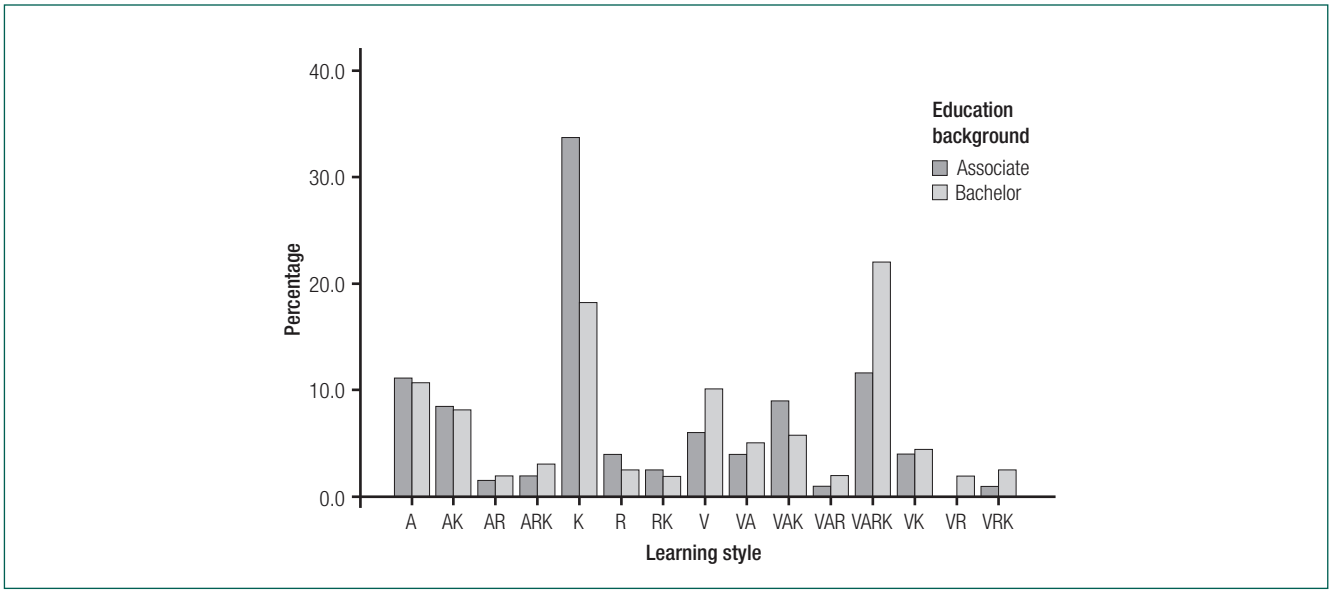

Figure 3. Comparison of VARK subcategories among bachelor degree and associate degree nursing students

modal among bachelor degree students was greater than that of associate degree students (23.27% vs. 20.60%). The percentage of the trimodal did not appear to have much difference among bachelor degree students and associate degree students (13.21% vs. 13.07%) (Figures 1 and 2).

The learning style preference of bachelor degree students was more variable and consisted of four types of unimodal learning (V, A, R, and K), six types of the bimodal (VA, VR, VK, AR, AK, and RK), four types of the trimodal (VAR, VAK, VRK, and ARK) and quadmodal (VARK). In contrast, the VR bimodal learning style was not demonstrated in associate degree students. Among the bachelor and associate degree students who preferred the bimodal, the majority showed a preference for the AK modality. Of the trimodal, more students preferred the VAK modality (Figure 3).

Discussion

The learning style is a relatively stable individual characteristic, is shaped over a long time and is influenced by several factors, including demographic characteristics, internal personality traits, external teaching environments among other factors.[16] The learning style can also be changed as the influence factors constantly change. This investigation was carried out to determine if the educational background influences the learning style of nursing students and to provide the basis for education reform, which is suitable for bachelor and associate degree students.

In our study, the learning style of bachelor degree students varied more than that of associate degree nursing students. The multimodal learning style was the most popular among bachelor degree nursing students, while associate degree nursing students liked the unimodal learning style best. This finding indicated that the bachelor degree nursing students preferred the information demonstrated by multiple sensory modalities and that they can adapt to different teaching methods more easily than college nursing students. A similar study conducted in the University of Colombo and the Postgraduate Institute of Medicine showed that the majority of medical undergraduates were multimodal learners, and the majority of postgraduates had unimodal (52.9%) learning styles.[15] Paiboonsithiwong's study showed that the most preferred VARK learning style among medical students was quadmodal.[17] The reasons for the difference among bachelor degree nursing students and associate degree nursing students may be multifactorial. Differences may be mainly attributed to the fact that both undergraduate and associate degree nursing students had made adjustments in their own learning styles in the teaching process to adapt to the teaching environment and

teaching style. As we know, bachelor degree students enjoy highly professional teaching faculty and diverse teaching strategies and methods. However, there is relatively weak teaching staff, single teaching methods and inflexible teaching strategies among the associate degree nursing students. In addition, a higher workload with increasingly tight course schedules was identified as a factor that made bachelor degree students shift towards more comprehensive and flexible learning styles.

In the unimodal learning style category, we found that the kinaesthetic sensory modality was the most preferred learning style among both the bachelor and associate degree nursing students, followed by the auditory, visual and read-write modalities. In addition, the kinaesthetic score was much higher than the score of the other modalities. All of the data conveyed a message to us that nursing students prefer to experience their learning by practising with all of their senses and want their teachers to use hands-on methods. This outcome was consistent with several previous studies. The study by Whillier showed that chiropractic students had a preference for the kinaesthetic learning style, which did not change over the course of the study.[12] Liew found a majority of the students had a unimodal (kinesthetic) learning style.[18] The study by Turner showed that the majority of paediatric residents were kinaesthetic.[19] This finding was one of the major reasons why the nursing profession was nothing but a practical discipline and motivated nursing students to gradually become kinaesthetic learners through continuous learning. In addition, the opinion that the kinaesthetic modality of learning is suitable for brain function is also a plausible explanation.[20] In any learning process, the brain acts as information processor, which can integrate multiple sensory inputs. Kinaesthetic learners prefer to access information via all their senses, which include touch, smell, sight, taste and hearing.

Implications for the teaching-learning process

Students are widely believed to grasp information in different ways, and no learning style is superior to others. However, from previous studies, we found that there is a certain relationship between learning styles and academic achievement. Ojeh's study of pre-clinical medical students showed that students with the multimodal learning style had better academic performance.[21] Dobson's study among physiology students noted a correlation between academic performance and the kinaesthetic sensory modality.[22,23] Finding ways to improve their academic performance by adjusting the learning style of students is currently a hot topic in research. Furthermore, if the teaching strategy that the teacher used is catered to the learning style of the students, this strategy will influence the academic performance to some extent. Based on student feedback, teaching methods should be constantly revised to suit the learning style of the students.

In our study, more students tended to use the kinaesthetic modality to learn. This finding requires abstract and conceptual material presented in a way that can mobilize their multi-sensory experience, such as metaphors, suitable analogies and real-life examples. Teachers can also make full use of role playing, situational simulations, classroom games, interesting experiments, experiential learning and field trips to match the need of the students. The other important finding was that the score of the read-write modality was the lowest among all of the students. This finding indicated that the traditional blackboard writing teaching methods based on textbooks filled with bullet points repeated on every page and little white space may not be the ideal method, as this method is suited best to read-write students. Multimedia teaching and appropriate adapted textbooks are two necessary features that need to be emphasized in curriculum reform.

Second, one of the most important findings of this study was that more bachelor degree students preferred a multimodal learning style, whereas more associate degree students liked the unimodal style. Different teaching methods and strategies should be used to cater to the needs of the bachelor degree students and associate degree students. The bachelor degree students preferred to receive information in a variety of modes and may be able to adjust to the different teaching styles. Teachers need use a relatively rich array of teaching styles and methods based on the course characteristics. For associate degree stu-

dents, teachers should try to match their teaching styles with the dominant preferences of the students for kinaesthetic and auditory unimodal learning styles. On the other hand, multiple learning methods are helpful in improving student achievement. Thus, teachers also need advancing and enriching teaching methods to cultivate multiple approaches for student learning. Some research has been conducted to explore multiple approaches, and the teaching method of problem-based learning (PBL) was regarded as the ideal one. The study by Alkhasawneh, which used PBL as a teaching methodology in those enrolled in a maternity nursing course, found that the percentage of multimodal learners increased from 54% in the pre-test to 68% in the post-test.[24]

Finally, every student is believed to acquire information in different ways, and no learning style is superior to others. Making every student take full advantage of their own learning style is key. Therefore, teachers can divide students into different learning groups with homogeneous or heterogeneous learning styles. Research previously showed that groups learning with a heterogeneous learning style was better than that with a homogeneous learning style. In the heterogeneous learning group, the visual learners study with graphs, symbols, charts and flow diagrams. The aural learners prefer to listen to lectures and share their ideas when discussing them with other students. However, at times, the aural learners are bad at taking notes from what they hear. The read-write learners like reading textbooks or related books in the library, and they usually can keep track of the main content and key information told by their teachers. The notes they write can provide learning materials for every student to review in the future. The kinaesthetic learners listen to stories, cases, analogies, examples and experiments, but they may likely miss some theoretical information. Every student acts as a demonstrator to share their learning experience to others (such as their notes, maps, patterns of information created by themselves, and cases, among other things). By communicating with each other, students can optimize the learning strategies and problem-solving methods, which are helpful in improving a student's academic performance.

There were some limitations in the study. First, the study demonstrated the influence of educational background on learning styles, but the data source was limited to only two student groups of bachelor degree and associate degree nursing students. Thus, other educational-level students should be involved. Second, the sample was from one university and one college in Changsha, Hunan. The study will require further research to test the results in other provinces.

Conclusion

In our study, a major finding was the significant difference between bachelor degree nursing students and associate degree nursing students. The majority of bachelor degree nursing students preferred a multimodal learning style, while most of the associate degree nursing students preferred the unimodal learning style. This finding calls for suitable teaching methods and strategies to meet the needs of the nursing students with different educational backgrounds. The other important finding in our study was the high prevalence of the kinaesthetic modality between the bachelor and associate nursing students with a unimodal learning style. The study recommends that more hands-on teaching methods be fully applied in order to enhance the learning efficiency and learning achievement of the students. Taking a survey on the relationship between the academic performance of nursing students and their learning style is very important. In addition, further research is also needed to examine the effect of teaching reform strategies based on the learning style preference of all of the nursing students from this study.

Acknowledgements

The authors would like to thank the teachers in the Faculty of Nursing, Central South University and the Vocational Health School for research support that allowed this study to be carried out smoothly. We also appreciate the voluntary participation and support from the nursing students.

Collaborations

Zhu Hong-rui, Zeng Hui, Zhang Hua, Zhang Hong-yu, Wan Feng-jing, Guo Hong-hua and Zhang Cai-hong contributed with the project conception, analysis and interpretation of data, critical reviewof the intellectual content and final approval of the version to be published.

References

1. Ahmad CN, Shaharim SA, Abdullah MF. Teacher-student interactions, learning commitment, learning environment and their relationship with student learning comfort. J Turkish Sci Educ. 2017; 14(1):57-72.
2. McLean M, Gibbs TJ. Learner-centred medical education: improved learning or increased stress? Educ Health. 2009; 22(3):287.
3. Nasiri Z, Gharekhani S, Ghasempour M. Relationship between learning style and academics status of Babel Dental Students. Electron Physician. 2016 May;8(5):2340–5.
4. Hallin K, Haggstrom M, Backstrom B, Kristiansen LP. Correlations Between Clinical Judgement and Learning Style Preferences of Nursing Students in the Simulation Room. Glob J Health Sci. 2015;8(6):1–13.
5. Khanal L, Shah S, Koirala S Exploration of preferred learning styles in medical education using VARK modal. Rus Open Med J. 2014; 3(5):1-8.
6. Stirling BV, Wadha A, .Alquraini MN. Using VARK to assess Saudi nursing students' learning style preferences: Do they differ from other health professionals? J Taibah Univ Med Sci. 2017;12(2):125-30.
7. Allen S, Swidler M, Keiser J. Aligning pedagogy of american business language with marketing students' preferred learning styles. Procedia Soc Behav Sci. 2013; 70(25):1254-64.
8. Kharb P, Samanta PP, Jindal M, Singh V. The learning styles and the preferred teaching-learning strategies of first year medical students. J Clin Diagn Res. 2013;7(6):1089–92.
9. Nuzhat A, Salem RO, Hamdan NA, Ashour N. Gender differences in learning styles and academic performance of medical students in Saudi Arabia. Med Teach. 2013;35(Supl 1):S78-S82.
10. 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.
11. Sarabi-Asiabar A, Jafari M, Sadeghifar J, Tofighi S, Zaboli R, Peyman H, Salimi M, Shams L. The relationship between learning style preferences and gender, educational major and status in first year medical students: a survey study from iran. Iran Red Crescent Med J. 2014;17(1):e18250.
12. Whillier S, Lystad RP, Abi-Arrage D, McPhie C, Johnston S, Williams C et al. The learning style preferences of chiropractic students: A cross-sectional study. J Chiropr Educ. 2014;28(1):21–7.
13. James S, D'Amore A, Thomas T. Learning preferences of first year nursing and midwifery students: utilising VARK. Nurse Educ Today. 2011;31(4):417–23.
14. Wong RS, Siow HL, Kumarasamy V, Shaherah Fadhlullah Suhaimi N. Interdisciplinary and inter-institutional differences in learning preferences among Malaysian medical and health sciences students. J Adv Med Educ Prof. 2017;5(4):164–71.
15. SamarakoonL, Fernando T, Rodrigo C. Learning styles and approaches to learning among medical undergraduates and postgraduates. BMC Med Educ. 2013;13(1):42-53.
16. Felder RM, Brent R. Understanding student differences. J Eng Educ. 2005;94(1): 57-72.
17. Paiboonsithiwong S, Kunanitthaworn N, Songtrijuck N. Learning styles, academic achievement, and mental health problems among medical students in Thailand. J Educ Eval Health Pro. 2016;13:38. https://doi.org/10.3352/jeehp.2016.13.38
18. Liew S C, Sidhu J, Barua A. The relationship between learning preferences (styles and approaches) and learning outcomes among pre-clinical undergraduate medical students. BMC Med Educ. 2015; 15(1):1-7.
19. Turner DA, Narayan AP, Whicker SA, Bookman J, McGann KA. Do pediatric residents prefer interactive learning? Educational challenges in the duty hours era. Med Teach. 2011;33(6):494–6.
20. Dekker S, Lee NC, Howard-Jones P, Jolles J. Neuromyths in education: prevalence and predictors of misconceptions among teachers. Front Psychol. 2012;3:429.
21. Ojeh N, Sobers-Grannum N, Gaur U, Udupa A, Majumder MA. Learning style preferences: A study of pre-clinical medical students in Barbados. J Adv Med Educ Prof. 2017;5(4):185–94.
22. Dobson JL. A comparison between learning style preferences and sex, status, and course performance. Adv Physiol Educ. 2010;34(4):197–204.
23. Dobson JL. Learning style preferences and course performance in an undergraduate physiology class. Adv Physiol Educ. 2009;33(4):308–14.
24. Alkhasawneh IM, Mrayyan MT, Docherty C, Alashram S, Yousef HY. Problem-based learning (PBL): assessing students' learning preferences using VARK. Nurse Educ Today. 2008;28(5):572–9.