

Educational Implications of VARK Learning Styles: Academic Performance and Pedagogical Preferences among Korean Pharmacy Students

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ABSTRACT

Background: Understanding and adapting instruction to pharmacy students' learning styles can catalyze educational outcomes, fostering the transition from knowledge acquisition to actionable skills. We investigated the learning styles of pharmacy students using the VARK model and explored their preferences for instructional methods before developing a preceptorship curriculum. **Materials and Methods:** Our study employed a descriptive questionnaire-based approach involving pharmacy students from S City, Korea, spanning from fourth-year undergraduates to graduates. Participants underwent evaluation using the VARK test (version 7.0) to ascertain their preferred learning modalities, which encompassed Visual (V), Aural (A), Read/write (R) and Kinesthetic (K) tasks. A total of 57 responses were collected from the 127 distributed questionnaires, yielding a response rate of 44.8%. **Results:** The findings revealed that most students (94.7%) utilized all four learning modalities, with 'Read/Write' being the most prevalent. Significantly more males than females preferred the 'Visual' styles. However, no significant correlations were observed between learning style and students' academic performance or graduation status. Most students indicated a preference for instructor-led face-to-face teaching over online methods, with no notable differences in learning preferences among the various VARK modalities. While the VARK model aids in identifying student preferences, it does not exert a significant influence on academic outcomes or pedagogical preferences. **Conclusion:** These results underscore the necessity for teaching strategies to be adaptable to educational content rather than strictly adhering to students' learning style preferences.

Keywords: Learning Style, Educational Measurement, Teaching, Academic Performance, Educational Status.

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INTRODUCTION

The Accreditation Council for Pharmacy Education has resolved to implement outcome-based education, focusing on student competencies.¹ This shift necessitates a change in teaching methods. In pharmacy courses, it is recommended to employ self-directed methods, allowing learners to actively engage, make voluntary choices and provide feedback to both instructors and students. In practical training courses, instructors are encouraged to recognize students' needs and accomplishments, providing feedback to facilitate the attainment of educational outcomes.² When selecting learners for feedback solicitation and curriculum design, it is imperative to take into account their learning styles to improve educational outcomes.³ Adapting instruction to

students' learning styles can enhance educational outcomes, helping students move from knowledge acquisition to applying their skills.⁴

Learning style refers to a student's preferred approach to learning and the strategies employed in an educational context, encompassing cognitive, emotional and social-psychological processes through which learners perceive and interact with the educational environment.⁵ In healthcare education, one of the most commonly utilized methods for analyzing learners' learning styles is the VARK model, proposed by Fleming *et al.*⁶ This model categorizes learning styles as Visual (V), Auditory (A), Read/write (R) and Kinesthetic (K), identified through a questionnaire. Visual learners prefer learning through visual aids such as charts, graphs, models and diagrams. Auditory learners, in contrast, favor discussions, stories, presentations and conversations. Read/write learners obtain information primarily from written texts, while kinesthetic learners thrive on hands-on activities, experiences, cases and interactions. To identify preferred learning styles,



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learners complete a survey-style VARK test, providing multiple responses which are then categorized according to a formula to determine the learner's dominant type.

Research on learning styles and outcomes in healthcare education has been ongoing since the 1970s,⁷ including in fields such as medicine, nursing, physical therapy and dentistry, aiming to inform the development of pedagogical approaches.⁴ Emphasizing the importance of understanding how students learn, studies have shown that adults can achieve educational outcomes with appropriate instructional approaches tailored to specific educational topics.⁸ Studies have indicated that medical students tend to exhibit a preference for a single learning style during the initial stages of their education.⁹ However, there is mounting evidence supporting the efficacy of a multimodal approach, which entails the integration of two or more learning modalities.¹⁰ These findings were corroborated by a study involving Korean medical students.¹¹ Furthermore, studies were conducted to determine the relationship between these learning styles and student educational outcomes as measured by grade point average.⁹ In dentistry, an analysis of the relationship between VARKs and learning outcomes revealed that the predominance of single or dual models was independent of learning outcomes.¹² Additionally, research is underway on the use of VARKs to identify learners' pedagogical needs.

The utilization of VARKs in pharmacy education is comparatively less widespread than in other healthcare education. The identification and application of learning preferences enables the creation of an effective educational experience for students.¹³ While learning preferences have been explored in pharmacy students,¹⁴ there is a lack of research examining the relationship between learning preferences and learning outcomes in pharmacy students compared to those in other healthcare education. Consequently, there is a need to address this research gap to enhance the quality of pharmacy education to facilitate the development of effective pedagogy and achieving educational goals.

To date, research on learning styles and pedagogical style preferences among pharmacy students is limited. Therefore, this study was performed to identify VARKs among pharmacy students. We also analyzed the relevance between learning styles and pedagogical preferences. This study provides a basis for understanding learners and identifying their needs to ensure effective educational development.

MATERIALS AND METHODS

A questionnaire-based descriptive approach was employed to ascertain the learning styles of pharmacy students, aiming to inform the development of a preceptorship curriculum. The study encompassed fourth- and fifth-year students from S City in Korea, along with sixth-year students and graduating seniors who had completed pharmacotherapy and were selected for participation.

The subjects were recruited via an online recruitment process. Before initiating the survey, participants were briefed on the study's objectives and their right to withdraw at any stage. They were also apprised of the voluntary nature of their involvement and the confidentiality of their responses. The survey was administered online. Participants were informed that there were no penalties for non-participation, that the study was voluntary and that the results would be anonymized and destroyed after the study was conducted.

The average factor reliability of the questionnaire (Cronbach's α) ranged from 0.574 to 0.676. This study received approval from the Institutional Review Board of S University (IRB# 1040173-202402-HR-003-01).

The VARK test© 7.0 Korean version developed by Fleming, consisting of 16 questions, was used to test learning styles. Items were categorized as V, A, R and K according to the content answers. Following instructions on the test sheet, the preferred learning style was quantified and identified. The distribution of student utilization of each learning type was also examined. Students were categorized into single, double, triple and quadruple learning types according to their use of each learning type.

Additionally, differences in learning types were examined according to students' gender, graduation status, age and grade distribution. Data on graduation status and age were collected at the time of the study. For grades, the level of achievement was determined based on the previous semester's grades at the time of the study. Finally, the results of teaching methods were analyzed in two ways. First, we analyzed the preference for learner-centered education over instructor-centered education and then identified differences according to VARK variables. Second, we analyzed preferences for online education. Differences in VARK variables were also examined.

To identify participants' characteristics, we evaluated the frequency and distribution of each item. To identify differences between groups, the Kruskal-Wallis test was employed to assess differences in learning styles based on gender, graduation status and age. Mann-Whitney U test was used to detect differences in learning styles based on gender, graduation status and age. All statistical tests were conducted at a significance level of $p < 0.05$.

RESULTS

A total of 127 questionnaires were distributed and 57 were returned, resulting in a 44.8% response rate. Of the 57 respondents, 33 were female and 24 were male. The median age of the respondents was 29 years; 42 respondents were current students and 15 were graduates. In terms of postgraduate career paths, most respondents indicated that they aspired to be employed in local pharmacies and medical organizations (Table 1). The results of the V, A, R and K type survey indicated that the most preferred learning type was R, followed by V and K. Differences between the

Table 1: Demographic and Academic Characteristics of the Study Participants.

Demographics		n (%)
Gender	Male	24 (42.11)
	Female	33 (57.89)
Year of Study	4	7 (12.28)
	5	30 (52.63)
	6	5 (8.77)
	Graduate	15 (26.32)
Age median (q1-q3)		29.0 (27.0-31.0)
Future job	Community pharmacy	38 (66.67)
	Hospital	8 (14.04)
	Company	2 (3.51)
	Government	1 (1.75)
	Others	8 (14.04)
	Academic performance	Below average
	Average	20 (35.09)
	Above average	17 (29.82)
	Excellent	11 (19.30)

two groups were significant. The learning style survey indicated that most students (54/57 students, 94.7%) used all four learning types (V, A, R and K) (Table 2). Male students demonstrated a stronger preference for V and R than female students, with V showing a statistically significant difference (5.0 (3.0-7.0) vs 3.0 (2.0-5.0), $p=0.03$). Older students and graduates exhibited greater utilization of learning modalities; however, no significant differences were observed (Table 3). Furthermore, students in higher grades utilized a larger number of learning modalities, with the highest grades using a higher prevalence of R, although the difference was not significant (Table 4). Regarding learning preferences, there was a clear preference for instructor-led classes, particularly for a face-to-face approach rather than an online approach. There was no difference between each learning modality and learning preferences (Tables 5 and 6).

DISCUSSION

This study was conducted to analyze learners' learning styles and explore their instructional preferences before developing a preceptorship curriculum. The main findings of the study were as follows. First, most pharmacy school learners in Korea utilized all elements of V, A, R and K. Second, males were significantly more likely than females to utilize V as a learning style. Third, there was no significant relationship between the utilization of

Table 2: VARK Learning Style Distribution among Study Participants.

Learning type	Median (q1-q3)	p
V	4.0 (3-6)	0.001
A	5.0 (4-7)	
R	6.0 (4-8)	
K	4.0 (3-6)	
Learning style		n (%)
Trimodal		
	ARK	2 (3.5)
	VRK	1 (1.8)
Quadmodal	VARK	54 (94.7)

V: Visual; A: Aural; R: Read/Write; K: Kinesthetic.

V, A, R, or K and learning outcomes or grade point averages. Fourth, students exhibited a preference for instructor-centered and face-to-face-centered learning styles, but this did not differ among learning styles.

In the field of healthcare education, ongoing attempts have been made to identify and utilize preferred learning styles in the curriculum. The most popular method for identifying learners' learning styles is the VARK method.¹⁰ For pharmacy school learners, studies have shown a preference for V.¹⁵ In our study, all learners used more than one learning style. The R technique is the most commonly used modality. This result may be attributed to the effects of Korea's text-oriented education system, which was practiced for many years before college. The exams administered during the university curriculum and licensing may also be related to the maintenance and perpetuation of this learning style. The use of multiple modalities of instruction and associated assessments in the pre-university years allows for the development and advancement of multiple learning styles in students.¹⁶ Previous studies in pharmacy a single modality was dominant. Pharmacy students and technicians were shown to favor single or dual modalities.¹⁷⁻¹⁹ In contrast, studies of other healthcare learners, such as those in medicine and dentistry, revealed that students use multiple modalities, which is consistent with our findings.^{10,20} These results suggest the need for further research on pharmacy students that considers curricular and cultural differences.

In examining specific demographic variables, we found that males were more likely than females to prefer the Visual modality. This finding is aligned with some studies, though others show differing results. While some research suggests female students tend to use more learning modalities than males, such as a study of pharmacy students in Malaysia, others have found no significant gender differences in modality preferences, as observed in a study on South Korean medical students.^{11,21,22} This suggests that gender differences in learning style preferences may vary depending on the educational context and population.

Table 3: VARK Learning Style Scores by Sex, Age and Academic Status.

Learning Style Category	Sex			Age (years)			Academic status		
	Male (n=24)	Female (n=33)	p-value	20-30 (n=41)	30> (n=16)	p-value	Undergraduate (n=42)	Graduate (n=15)	p-value
V	5.0 (3.0-7.0)	3.0 (2.0-5.0)	0.03*	4.0 (3.0-5.0)	5.5 (3.0-7.0)	0.32	4.0 (3.0-6.7)	3.0 (3.0-5.0)	0.36
A	5.0 (4.75-8.0)	5.0 (3.0-7.0)	0.25	5.0 (4.0-7.0)	6.0 (3.7-8.2)	0.33	5.0 (3.25-7.0)	6.0 (5.0-7.0)	0.62
R	6.0 (4.0-8.2)	5.0 (4.0-8.0)	0.62	5.0 (4.0-7.0)	7.5 (4.0-9.0)	0.30	5.5 (4.0-8.0)	6.0 (4.5-8.0)	0.59
K	4.0 (2.0-6.0)	4.0 (3.0-6.0)	0.96	4.0 (2.0-6.0)	4.0 (3.0-6.25)	0.62	4.0 (2.0-6.0)	4.0 (3.0-5.5)	0.40

V: Visual; A: Aural; R: Read/Write; K: Kinesthetic * $p < 0.05$.

Table 4: Comparison of VARK Learning Style Scores Among Academic Performance Groups.

Learning Style Category	Grade				p-value
	Below average (n=9)	Average (n=20)	Above average (n=17)	Excellent (n=11)	
V	4.0 (3.0-5.0)	4.0 (3.0-6.25)	4.0 (3.0-8.0)	3.0 (1.5-5.0)	0.27
A	5.0 (4.0-5.0)	5.0 (3.75-7.0)	7.0 (4.0-7.0)	5.0 (3.0-5.0)	0.61
R	4.0 (3.0-7.0)	5.0 (4.0-9.0)	6.0 (5.0-9.0)	6.0 (4.5-8.5)	0.48
K	3.0 (2.0-4.0)	3.5 (2.0-6.25)	4.0 (3.0-6.0)	5.0 (3.5-7.0)	0.28

V: Visual; A: Aural; R: Read/Write; K: Kinesthetic.

Research is also being conducted to determine the relationship between learning styles and student performance. Studies of medical students demonstrated that learning style is not a significant predictor of learning outcomes.^{9,20,23} Studies of dental students yielded similar findings.¹² In this study, students exhibiting moderate to high levels of performance were likely to use more learning styles, although this was not the case for the highest-performing group. There was no significant difference between the VARK learning styles and student educational outcomes.

Learning preference has been criticized there is little evidence linking specific learning styles to improved educational outcomes.²⁴ However, one medical student study showed that learning styles were independent of grades and that the pedagogy utilized in a specific subject was correlated with learning outcomes.²³ This result showed teaching methods may be more important than a learner's preferred learning style; additionally, other factors may be involved in learning performance, which requires further research.²⁵ This highlights the need for further research into how instructional methods, rather than learning styles alone, contribute to educational outcomes.

Pharmacy education, like that of other health professionals, encompasses a broad spectrum of theoretical and practical training. Consequently, there is a pressing need to develop and

diversify teaching methods to achieve more effective educational outcomes. The necessity to develop pedagogical approaches was highlighted during the COVID-19 pandemic.^{26,27} In this study, two aspects of VARK and students' preferred teaching methods were identified: learner-centered and online-centered. While there were differences in the use of learning modalities, these differences did not significantly impact their educational preferences. We found that students preferred instructor-led learning that is conducted offline, which is consistent with previous research in which students were shown to favor lecture-based learning.

These findings were inconsistent with those previous study, which indicated that students who employ multimodality tend to favor student-centered pedagogical approaches.²⁸ Furthermore, when considering the educational outcomes that can be attained through the integration of diverse learning methodologies,²⁹ it suggests that the impact of these learning preferences may be an important factor to consider in the development of teaching methods.

Furthermore, factors other than learning modality can also be used to assess educational preferences. Additional factors such as students' socioeconomic status and prior learning tendencies should be assessed and a comprehensive exploration of preferred learning tools should be conducted and utilized in education.³⁰ Further studies are required to determine the outcomes of

Table 5: Comparison of VARK Learning Style Scores by Teaching Preference.

Learning Style Category	Student-centered teaching preference (reference. Teacher-centered)					p-value
	Strongly Disprefer (n=5)	Disprefer (n=20)	Neutral (n=14)	Prefer (n=12)	Strongly Prefer (n=6)	
V	3.0 (2.0-5.0)	4.0 (3.0-7.0)	4.0 (3.0-4.7)	6.5 (2.0-7.2)	3.0 (3.0-3.7)	0.41
A	4.0 (2.0-5.0)	5.0 (4.0-7.5)	5.0 (4.0-6.7)	6.5 (4.5-7.0)	5.0 (2.2-7.7)	0.41
R	8.0 (5.0-9.0)	6.0 (4.0-7.2)	5.5 (3.5-7.0)	7.0 (5.0-10.2)	5.5 (3.5-6.7)	0.41
K	2.0 (2.0-5.0)	5.0 (3.0-6.2)	4.0 (2.0-4.0)	3.5 (3.0-8.2)	4.0 (2.2-5.7)	0.41

V: Visual; A: Aural; R: Read/Write; K: Kinesthetic.

Table 6: Comparison of VARK Learning Style Scores by teaching preference.

Learning style category	Online-centered teaching preference (reference. Off-line centered)					p-value
	Strongly disprefer (n=7)	Disprefer (n=22)	Neutral (n=13)	Prefer (n=10)	Strongly prefer (n=5)	
V	4.0 (3.0-5.5)	6.0 (3.0-7.7)	3.0 (3.0-4.0)	4.0 (2.5-4.7)	3.0 (3.0-3.0)	0.11
A	5.0 (2.5-7.0)	6.0 (4.2-7.7)	5.0 (4.0-6.0)	5.5 (4.2-6.7)	3.0 (2.0-5.0)	0.39
R	5.0 (4.5-6.5)	7.5 (5.2-10.0)	5.0 (4.0-7.0)	4.0 (3.2-5.7)	5.0 (2.0-7.0)	0.11
K	4.0 (2.5-6.0)	5.0 (3.0-8.0)	3.0 (2.0-5.0)	3.5 (3.0-4.0)	5.0 (5.0-5.0)	0.17

V: Visual; A: Aural; R: Read/Write; K: Kinesthetic

pharmacy education courses when using innovative teaching methods.³¹

The limitations of this study are that it was a pilot test utilizing results from a limited sample size with a low response rate and grade level variation. Further studies of pharmacy students at multicenter institutions are required to confirm these findings and explore additional variables.

CONCLUSION

Although the VARK model helps identify student preferences, these preferences do not significantly influence academic outcomes and pedagogical preferences. Thus, teaching strategies may need to be more adaptive to the educational content rather than to the student learning style preferences. Further studies of a larger and more diverse sample are necessary to validate our findings and investigate other potential factors affecting educational outcomes.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

- Paradis E, Zhao R, Kellar J, Thompson A. How are competency frameworks perceived and taught? An exploratory study in the context of pharmacy education. *Perspect Med Educ.* 2018;7(3):200-6. doi: 10.1007/s40037-018-0432-y, PMID 29704169.
- Fjortoft N. Self-assessment in pharmacy education. *Am J Pharm Educ.* 2006;70(3):64. doi: 10.5688/aj700364, PMID 17136185.
- Vasileva-Stojanovska T, Malinovski T, Vasileva M, Jovevski D, Trajkovik V. Impact of satisfaction, personality and learning style on educational outcomes in a blended learning environment. *Learn Individ Differ.* 2015;38:127-35. doi: 10.1016/j.lindif.2015.01.018.
- DiBartola LM. The learning style inventory challenge: teaching about teaching by learning about learning. *J Allied Health.* 2006;35(4):238-45. PMID 17243440.
- Curry L. Learning preferences and continuing medical education. *Can Med Assoc J.* 1981;124(5):535-6. PMID 7470997.
- Fleming ND. VARK visual, aural/auditory, read/write, kinesthetic. Bonwell green mountain Falls. New Zealand: Fleming ND; 2006.
- Plovnick MS. Primary care career choices and medical student learning styles. *J Med Educ.* 1975;50(9):849-55. doi: 10.1097/00001888-197509000-00002, PMID 1171243.
- Muijsenberg AJ, Houben-Wilke S, Zeng Y, Spruit MA, Janssen DJ. Methods to assess adults' learning styles and factors affecting learning in health education: A scoping review. *Patient Educ Couns.* 2023;107:107588. doi: 10.1016/j.pec.2022.107588, PMID 36502561.
- Padmalatha K, Kumar JP, Shamanewadi AN. Do learning styles influence learning outcomes in anatomy in first-year medical students? *J Fam Med Prim Care.* 2022;11(6):2971-6. doi: 10.4103/jfmpc.jfmpc_2412_21, PMID 36119314.
- Childs-Kean L, Edwards M, Smith MD. Use of learning style frameworks in health science education. *Am J Pharm Educ.* 2020; 84(7):ajpe7885. doi: 10.5688/ajpe7885, PMID 32773837.
- Yoo HH, Kim YJ. Assessment of VARK learning styles in Medical School and the influence of gender status, academic achievement. *J Korea Contents Assoc.* 2019;19(11):144-52.
- Mozaffari HR, Janatolmakan M, Sharifi R, Ghandinejad F, Andayeshgar B, Khatony A. The relationship between the VARK learning styles and academic achievement in dental students. *Adv Med Educ Pract.* 2020;11:15-9. doi: 10.2147/AMEP.S235002, PMID 32021538.
- Campos DG, Silva JL, Jarvill M, Rodrigues RC, de Souza Oliveira Kumakura AR, Campos DG. Instruments to evaluate undergraduate healthcare student learning styles globally: a scoping review. *Nurse Educ Today.* 2021;107:105141. doi: 10.1016/j.nedt.2021.105141, PMID 34534785.
- Williams B, Brown T, Etherington J. Learning style preferences of undergraduate pharmacy students. *Curr Pharm Teach Learn.* 2013;5(2):110-9. doi: 10.1016/j.cptl.2012.09.003.
- Saleem F, Hassali MA, Ibrahim ZS, Alrasheedy A, Aljadhey H. Learning styles of pharmacy undergraduates: experience from a Malaysian University. *Pharm Educ.* 2015;15.
- Rasul S, Bukhs Q. A study of factors affecting students' performance in examination at university level. *Procedia Soc Behav Sci.* 2011;15:2042-7. doi: 10.1016/j.sbspro.2011.04.050.
- Williams B, Brown T, Etherington J. Learning style preferences of undergraduate pharmacy students. *Curr Pharm Teach Learn.* 2013;5(2):110-9. doi: 10.1016/j.cptl.2012.09.003.
- Stanley ER, Hafford A, Naseman R, Li J, Worley M, Mehta BH. Assessment of pharmacy technician learning preferences and implications for training. *Am J Health Syst Pharm.* 2021; 78; Suppl 1:S16-25. doi: 10.1093/ajhp/zxaa362, PMID 33064128.

19. Alfarsi W, Elaghoury AH, Kore SE. Preferred learning styles and teaching methods among medical students: A cross-sectional study. *Cureus*. 2023;15(10):e46875. doi: 10.7759/cureus.46875, PMID 37954741.
20. Kamal I, Karim MK, Awang Kechik MM, Ni X, Razak HR. Evaluation of healthcare science student learning styles based VARK analysis technique. *Int J Eval Res Educ*. 2021;10(1):255-61.
21. Sarabi-Asiabar A, Jafari M, Sadeghifar J, Tofighi S, Zaboli R, Peyman H, *et al*. 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*. 2015;17(1):e18250. doi: 10.5812/ircmj.18250, PMID 25763269.
22. Bin Eid A, Almizani M, Alzahrani A, Alomair F, Albinhamad A, Albarrak Y, *et al*. Examining learning styles with gender comparison among medical students of a Saudi University. *Adv Med Educ Pract*. 2021;12:309-18. doi: 10.2147/AMEP.S295058, PMID 33840998.
23. Husmann PR, O'Loughlin VD. Another nail in the coffin for learning styles? Disparities among undergraduate anatomy students' study strategies, class performance and reported VARK learning styles. *Anat Sci Educ*. 2019;12(1):6-19. doi: 10.1002/ase.1777, PMID 29533532.
24. Cox L, Clutter J, Sergakis G, Harris L. Learning style of undergraduate allied health students: clinical versus classroom. *J Allied Health*. 2013;42(4):223-8. PMID 24326919.
25. Bidabadi NS, Isfahani AN, Rouhollahi A, Khalili R. Effective teaching methods in higher education: requirements and barriers. *J Adv Med Educ Prof*. 2016;4(4):170-8. PMID 27795967.
26. Lyons KM, Christopoulos A, Brock TP. Sustainable pharmacy education in the time of COVID-19. *Am J Pharm Educ*. 2020; 84(6):ajpe8088. doi: 10.5688/ajpe8088, PMID 32665717.
27. Almeman AA, Alrebish SA. Teaching strategies used in pharmacy. In: *Pharmacy education in the twenty-first century and beyond*. Elsevier; 2018. p. 125-45.
28. Alfarsi W, Elaghoury AH, Kore SE. Preferred learning styles and teaching methods among medical students: A cross-sectional study. *Cureus*. 2023;15(10):e46875. doi: 10.7759/cureus.46875, PMID 37954741.
29. Bhalli MA, Khan IA, Sattar A. Learning style of medical students and its correlation with preferred teaching methodologies and academic achievement. *J Ayub Med Coll Abbottabad*. 2015;27(4):837-42. PMID 27004335.
30. Rahim FF, Maideen SF, Rashid A, Abdulrahman S. The preferred public health medicine learning styles among medical students. *Int J Learn Teach Educ Res*. 2019;18(6):128-46. doi: 10.26803/ijlter.18.6.8.
31. Meng X, Yang L, Sun H, Du X, Yang B, Guo H. Using a novel student-centered teaching method to improve pharmacy student learning. *Am J Pharm Educ*. 2019;83(2):6505. doi: 10.5688/ajpe6505, PMID 30962633.

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