ORIGINAL ARTICLE

Trends in Learning Styles of Undergraduate Dental Students of A Dental College, Lahore

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OBJECTIVE: The study was conducted to determine the VARK (Visual, Auditory, Reading/Writing, Kinesthetic) based learning style preferences of the undergraduate dental students of Lahore Medical and Dental College, Lahore.
STUDY DESIGN: A cross-sectional study was conducted involving 237 students from the first, second, third and final year of the Bachelor of Dental Surgery (BDS) program. An English version of the VARK questionnaire v.7.8 was used as an evaluation tool. The results were analyzed using the IBM SPSS statistics v.23. Descriptive statistics were employed to analyze the data, while inferential statistics, including Chi-square tests, were used to explore differences between groups based on gender and pre-medical education streams.
RESULTS: The majority of the students (69%) were identified as multimodal learners, while 31% were uni-modal learners. Among the multimodal learners, 35% preferred a quad-modal learning style. No statistically significant differences were found in learning preferences when comparing gender groups or pre-medical education streams ($p > 0.05$).
CONCLUSION: This study highlights the predominance of multimodal learning styles among dental students, emphasizing the importance of tailored teaching strategies to address diverse learning preferences. Educators should consider integrating varied instructional methods to accommodate the preferences of their students. Future research should explore the impact of these learning preferences on academic performance and clinical skill acquisition to further refine teaching approaches in dental education.
KEY WORDS: Dental students, Learning style, LMDC, Undergraduate, VARK
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INTRODUCTION

The modern academic realm requires instructors to create educational materials that deliver essential professional competencies to their students.[1,2] Student training in dental education uses theoretical information, diagnostic methodology and hands-on practical instruction to build skills needed to care for patients effectively.[3] Providing education services that respect different learning approaches in students leads to the development of capable dental practitioners.[4,5] Various worldwide investigations demonstrated that different learning approaches students use impacts their course participation methods. Dental students across the U.S., U.K., Australia and India prefer learning with multiple instructional methods and show a strong preference for uniting vision-based and touch-based approaches.[6] The learning preferences of dental students are modified by gender as well as age and cultural background elements. Very little research exists about learning styles and their impact on teaching strategies and student performance in Pakistani dental institutions.[7,8]

The research goal for this study involves understanding which learning preferences exist among dental undergraduate students attending Lahore Medical and Dental College (LMDC). We seek to learn the effect of using learning style identification from freshman through senior students on teaching method optimization. Research carried out across the entire world supports adapting teaching methods to

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student learning preferences yet dental education has limited documentation of their effectiveness. The research output will establish critical information to enhance teaching strategies at LMDC and regarding equivalent Pakistani educational facilities which aims to boost student involvement and educational success while increasing satisfaction.

METHODOLOGY

The descriptive, cross-sectional study was executed in College of Dentistry, of Lahore Medical and Dental College, Lahore during the months of September - October 2022. The study was appraised and ratified by the Ethical Review Board of Lahore Medical & Dental College, Lahore (Ref #: LMDC/FD/628/22). All students of 1st, 2nd 3rd and 4th year of BDS were requested to participate, however only those students who gave their consent in agreement to their participation in the study were included. Therefore, written consent was obtained from all participants (age was 18 years and above). It was clarified to each group of students that they had the right to decline participation in the study at any stage. Anonymity and confidentiality were ensured. Basic information including age, gender and pre-medical qualification was required from each volunteer. An English version of the VARK questionnaire v.7.8 was used as an evaluation tool. It comprised of 16 scenario-based questions, each with four options, out of which one or more could be selected for each question.

All methods were performed in accordance with the relevant guidelines and research carried out within appropriate ethical framework. A net total of 237 students partook in the study. Assessment of the learning preferences for every participant was done using the stepping stone method given on the VARK website.[3] Consequently, learning inclinations were regarded as: uni-modal (V, A, R, or K); bi-modal (VA, VR, VK, AR, AK, and RK); tri-modal (VAR, VAK, VRK and ARK); or quad-modal (VARK). Statistical analysis was done using IBM SPSS statistics v.23. Descriptive statistics (frequencies and percentages) were used to present the distribution of learning preferences among the students. For comparisons, inferential statistics were applied using Chi-square tests to explore any significant differences between the groups based on age, gender, and pre-medical qualification. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 237 dental undergraduates provided written consent to participate in the study. The participants were distributed as follows: 67 (28.3%) first-year students, 53 (22.4%) second-year students, 66 (27.8%) third-year students, and 51 (21.5%) final-year students. The majority of the students were female (182/237).

As per the VARK model, the most prevalent learning preference among our students was the quad-modal style (VARK), accounting for 35% of participants. This was followed by kinesthetic (K) and aural (A) uni-modal learners, with 14% and 12%, respectively. Other combinations, such as A-K and V-A-K, were found in 10% of the students each. In total, 69% of the students preferred multimodal learning styles, while 31% favored a uni-modal style. Among the multimodal learners, 16% preferred bi-modal styles, 18% preferred tri-modal, and 35% preferred quad-modal learning. For uni-modal learners, the most common preferences were A (37.8%) and K (44.6%), with fewer students favoring V (9.5%) and R (8.1%).

The predominant bi-modal learning preference was A-K (61.5%), followed by R-K (12.8%), V-K (10.3%), V-A (7.7%), A-R (5.1%), and V-R (2.6%). Among tri-modal learners, V-A-K was most prevalent (54.8%), followed by A-R-K (26.2%) and V-R-K and V-A-R (9.5% each). Regarding the pre-medical education backgrounds, no significant difference in learning preferences was observed between students from different educational streams (A-levels and F.Sc.). Among the F.Sc students (188/237) and A-level students (49/237), the predominant learning style was quad-modal, at 33.5% for F.Sc and 38.8% for A-level students. Uni-modal styles were also prevalent, with 31.9% of F.Sc students and 28.6% of A-level students choosing this style.

In terms of gender differences, female students had a predominant uni-modal (38.2%) learning preference, followed by quad-modal (32.7%), while male students had a greater preference for quad-modal (34%) and uni-modal (29.1%) learning styles. However, no significant statistical difference was found between male and female students' learning preferences.

For year-wise distribution, quad-modal learning style was predominant across all years except for the third year, where uni-modal learning was more common. The prevalence of quad-modal learning style for first to fourth years was 37.3%, 39.6%, 31.8%, and 29.4%, respectively. The second most prevalent style was uni-modal, with prevalences of 29.9%, 35.8%, 37.9%, and 19.6% for first to fourth years, respectively. The prevalence of bi-modal learning styles was 20.9%, 11.3%, 15.2%, and 17.6% for first to fourth years, respectively. Tri-modal learning style was most prevalent in the third and fourth years, with 33.3% in the fourth year.

INTERPRETATION AND STATISTICAL ANALYSIS

Uni-modal learning refers to students who predominantly prefer a single mode of learning (V, A, R, or K). Bi-modal learners combine two learning modes (e.g., A-K, V-A), tri-modal learners use three modes (e.g., V-A-K), and quad-modal learners utilize all four modes (V-A-R-K). Multimodal learners are generally more flexible in their learning approaches, whereas uni-modal learners tend to focus on a single preferred method.

To assess the significance of differences between learning preferences based on gender, pre-medical education background, and academic year, we employed Chi-square tests. The level of significance was set at $p < 0.05$. No significant differences were found based on gender, pre-medical education background, or year of study.

DISCUSSION

The research revealed that dental undergraduates at Lahore Medical and Dental College show a preference for quad-modal learning (VARK) which is part of multimodal learning styles. Numerous studies show dental undergraduate students favor studying through multiple channels due to their understanding about the benefits of working across multiple learning pathways. Scientific literature worldwide demonstrated dental students tend to choose multimodal learning styles especially those with quad-modal characteristics.[9,10] Several factors probably contribute to this observed trend due to dental education requiring both theoretical foundations and hands-on abilities. Dental education requirements are better addressed through the flexible teaching strategies that match the multimodal learning style which includes visual, auditory and reading/writing and kinesthetic approaches.

A significant preference for kinesthetic and aural learning approaches in this research produces doubts about whether dental education requires more interactive hands-on educational techniques. The learning style of kinesthetic students succeeds best when they engage in activities like laboratory exercises and patient simulations and role play interactions that let them touch their study materials. The recommendations of previous researchers support combined theoretical and practical educational components to optimize retention levels of kinesthetic learners.[11,12] The environment that supports the development of students who learn through listening to audio signals is best suited for them. These students will benefit from additional opportunities which promote engagement through discussion-based activities.[13]

The variation between findings regarding gender-based learning styles might result from cultural factors that affected our study involving 182 out of 237 female students at LMDC. Research showed that female students demonstrate multi-modal favored learning patterns. However, the participants at LMDC displayed a lean toward uni-modal education especially embracing the kinesthetic approach. The distinctive learning environment at LMDC might have caused this

Figure 1: Frequency of various learning style inclinations according to VARK model

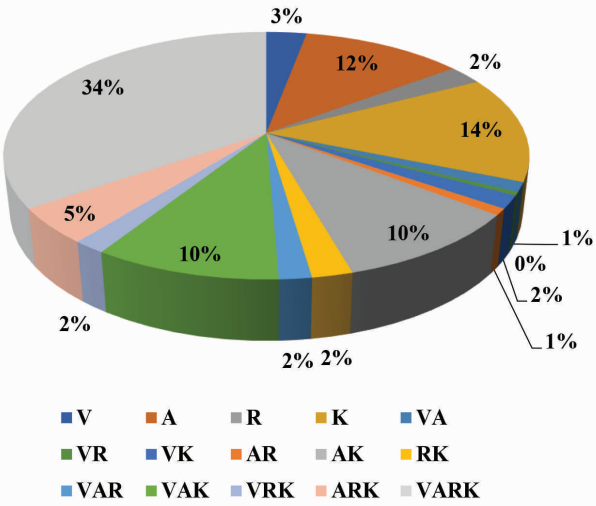


Figure 2: Scattering of learning style preferences amongst dental undergraduates

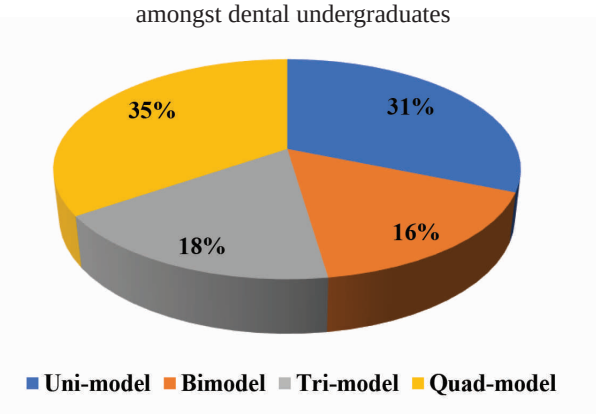


Figure 3: Distribution of learning style preferences according to pre-medical education

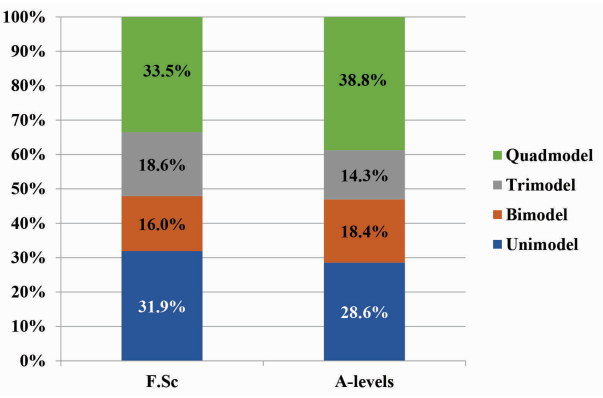


Figure 4: Distribution of learning style preferences according to gender

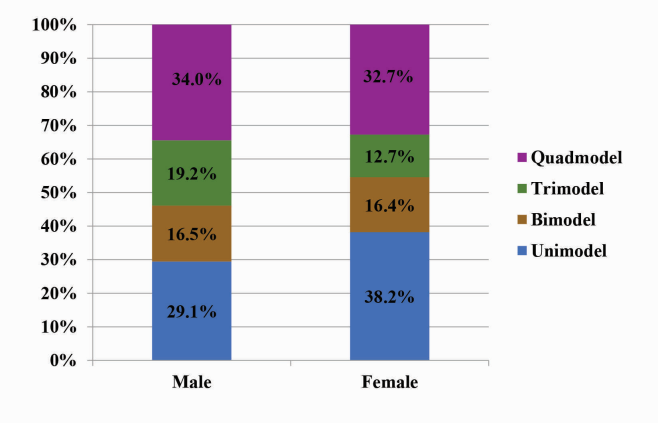
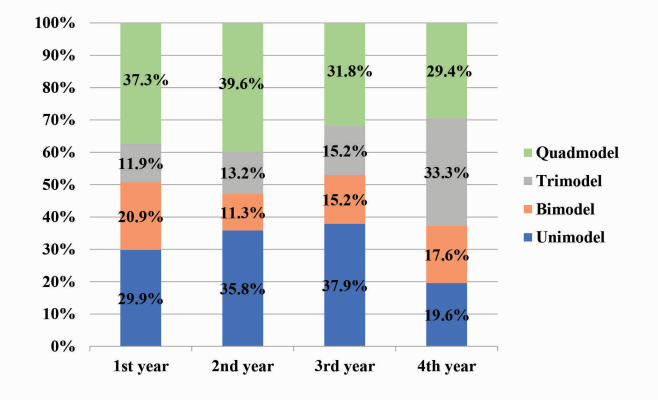


Figure 5: Distribution of learning style preferences according to educational years of the participants



difference because practical and clinical training starts at an early stage in the educational years. Male dental students with high scores on the quad-modal style require teaching strategies which go beyond traditional methods at the beginning of their dental education.

Faculties who want to personalize their teaching methods for students should develop instruction methods that harmoniously integrate various teaching approaches.[14] Here are recommendations from our findings: When choosing learning activities for Kinesthetic Learners students should benefit from physical interactions with educational content. Teachers must include practical teaching activities which include laboratory exercises with clinical simulations and patient case study examinations. Introduction of applied activities through role-play and model-based exercises helps learners develop their comprehension abilities.[15]

Aural Learners benefit from oral instruction and discussions. The teaching methodology should include enhanced auditory elements by employing audio lectures as well as podcasts and group discussions and case-based scenarios to address students who learn through sounds. Students who learn through hearing benefit from active classroom discussions that occur throughout each lecture.[16,17]

Students who learn best through vision need graphical depictions combined with charts and video content and visual educational aids. Basic lessons need visual supplements through diagrams along with charts and videos to help students understand difficult subjects. Educational slides containing precise visuals make the learning process more effective for visual learning students.[18]

Reading/Writing Learners prefer written information. Teachers can provide comprehensive written materials, including textbooks, notes, and handouts, alongside lectures. Encouraging these students to take detailed notes during lectures will also help them engage with the material.[19,20] By incorporating multiple instructional methods and making conscious efforts to use multimodal strategies, educators can improve the overall learning experience for dental students, fostering a more effective and comprehensive educational approach.

CONCLUSION

The study revealed that multimodal learning preferences, particularly the quad-modal style, dominate among dental undergraduates at Lahore Medical and Dental College, followed by preferences for kinesthetic and aural learning styles. While no significant differences were observed based on gender or pre-medical education backgrounds, the findings underline the importance of accommodating diverse learning preferences in dental education. Teachers and curriculum developers should adapt their strategies to better support these varying learning preferences. By employing more hands-on activities for kinesthetic learners, incorporating discussions for aural learners, and diversifying the teaching materials for visual and reading/writing learners, educational institutions can significantly enhance student engagement and academic success. Future research should explore the impact of these learning preferences on student performance and clinical skill acquisition across different educational stages to further refine teaching strategies.

COMPETING INTERESTS

The authors assert that they have no competing interests

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Not valid

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