DOI: https://doi.org/10.54393/pjhs.v6i7.3065

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (E): 2790-9352, (P): 2790-9344
Volume 6, Issue 07 (July 2025)

Original Article

OPEN ACCESS

Innovative Pedagogies: Exploring Effective Teaching and Learning Methodology from Students' Perspective

Mehwash Kashif[1*], Maliha Mohsin[2], Mahmood Ahmed Khan[3], Farzeen Tanwir[4], Asma Siddiqui[5] and Ahmad Bin Khalid Khan[4]

[1]Department of Oral Pathology, Karachi Medical and Dental College, Karachi Metropolitan University, Karachi, Pakistan
[2]Department of Oral Surgery, Karachi Medical and Dental College, Karachi Metropolitan University, Karachi, Pakistan
[3]Department of Surgery, Karachi Medical and Dental College, Karachi Metropolitan University, Karachi, Pakistan
[4]Department of Periodontology, Bahria University of Health Sciences, Karachi, Pakistan
[5]Department of Medical Education, Karachi Medical and Dental College, Karachi Metropolitan University, Karachi, Pakistan

ARTICLE INFO

Keywords:
Learning, Teaching, Traditional, Medical, Dental

How to Cite:
Kashif, M., Mohsin, M., Khan, M. A., Tanwir, F., Siddiqui, A., & Khan, A. B. K. (2025). Innovative Pedagogies: Exploring Effective Teaching and Learning Methodology from Students' Perspective : Effective Teaching and Learning Methodology from Students' Perspective.Pakistan Journal of Health Sciences, 6(7), 132-138. https://doi.org/10.54393/pjhs.v6i7.3065

Corresponding Author:
Mehwash Kashif
Department of Oral Pathology, Karachi Medical and Dental College, Karachi Metropolitan University, Karachi, Pakistan
mehwashkashif@gmail.com

Received Date: 17th April, 2025
Revision Date: 13th July, 2025
Acceptance Date: 19th July, 2025
Published Date: 31st July, 2025

ABSTRACT

In recent years, educational institutions have integrated innovative methods such as interactive learning, digital tools, and student-centered approaches into traditional teaching to enhance understanding and engagement. Evaluating their effectiveness requires insight into students' perceptions is crucial. **Objectives:** To evaluate innovations in traditional teaching and learning methodology from the students' perspective of a public institution. **Methods:** A cross-sectional study was conducted at a Public Sector College, with a sample size of 282 students recruited through non-probability convenience sampling. Medical and dental undergraduates aged 18-24 years from both genders were included, while graduates and faculty members were excluded. Data collection involved a questionnaire filled out by undergraduate students using "Google Forms." Data were analyzed on SPSS version 25.0. **Results:** Among 82 participants, 41.8% were MBBS students and 58.2% were BDS students. Most students (37.6%) had limited knowledge of non-traditional teaching methods, yet 86.9% believed that specific learning outcomes should be included for each topic. Interactive lectures were favoured over traditional ones (46.8%), and students preferred 45-minute lectures followed by 15 minutes of revision. Nearly half (49.3%) favoured audiovisual learning over rote textbook study. Additionally, 42.2% felt the grading system needs improvement, and 64.5% highlighted the importance of interactive student-teacher strategies. Many preferred knowledge-based activities and e-learning, with 47.9% favouring e-learning over textbooks. **Conclusions:** It was concluded that transforming learned concepts into applied knowledge is more beneficial for students. Therefore, enhancing medical education is crucial for developing more competent and skilled physicians in the future.

INTRODUCTION

In medical and dental schools, teaching and learning have always been difficult since these fields require a precise and in-depth understanding of human anatomy, Physiology and other complex structures. No one can dispute that, in the twenty-first century, when everything has entered an advanced phase, medical research will probably evolve rapidly to keep up with the most recent technological developments. Information and communication technology advancements will significantly impact the nature of medicine in the future, and it appears that the existing classroom model will not adequately prepare students for this future. Computer-aided education, virtual patients, augmented reality, human patient simulations, and virtual reality for competence evaluation are some new developments in teaching and assessment techniques [1]. Similarly, the field of teaching and learning itself has also

DOI: https://doi.org/10.54393/pjhs.v6i7.3065

revised over the years in correlation to the introduction of newer techniques. Medical and dental educators are becoming more concerned that the traditional lecture-based curriculum used to teach medical and dental students does not spark students' interest or instill a lifelong appreciation of learning. As a result, adjustments must be made to the traditional teaching and learning methods. Traditionally, the main teaching method in medical school has been traditional didactic lecture-based learning (LBL). Fundamentally, LBL is a teacher-centred method that depends on the educator passively imparting knowledge to the student. This kind of instruction rewards memorization of data without requiring students to comprehend the material, and it frequently employs evaluation techniques that encourage surface learning [2]. The most prestigious medical and dentistry institutions in the world regularly implement innovative teaching techniques. This has increased students' attention and comprehension level in addition to aiding lecturers in expanding the topics. Measurable variations have been reported in the ways that students like to absorb, process, and remember new information [3]. Teachers need to be extremely skilled and informed in order to optimize student learning. Instead of depending just on conventional techniques, clinical education should use contemporary e-learning resources, including interactive platforms and asynchronous films. Online collaboration, virtual settings, and blended learning all improve student engagement, particularly in intricate domains like dental education. To increase the efficacy and efficiency of this resource-intensive teaching process, it is essential to comprehend the learning preferences of dental students [4]. The way a person interacts with knowledge and their personal learning preferences determine their learning style. It has been proposed that by being aware of these differences in learning styles, teachers can adapt their methods to better fit the preferences of their students, increasing the effectiveness and efficiency of their lessons. Determining one's preferred learning style can assist students in making choices that will improve their academic performance and increase their degree of pleasure with their educational journey [5]. Studies on students' preferred learning styles have been conducted for years, and it has been acknowledged that improving teaching strategies is necessary to increase knowledge comprehension and application. This study employs a Google questionnaire to collect opinions on traditional lecture-based instruction and ideas for improvement from medical and dental students at a single college in Karachi, Pakistan. By highlighting individual variances in attention span, expectations, and self-confidence, it challenges the antiquated idea of uniform learners. To address this variance, a customized teaching strategy is needed. Multiple teaching modalities can better fulfil a range of learning demands, according to research [6, 7], which helps teachers combine old and modern approaches to create a more productive learning environment. The purpose of this study is to assess new developments in conventional teaching and learning approaches from the viewpoint of Karachi students. It is crucial to comprehend how students, who are the main stakeholders in the educational process, view the growing use of interactive tactics, digital tools, and student-centred approaches by educational institutions to improve engagement and learning results.

The study aims to offer insightful information that can guide future curriculum development, instructional strategies, and policy-making to raise the standard of education in Karachi's academic institutions by investigating student opinions regarding the efficacy, applicability, and impact of these innovations. Therefore, this study was planned to evaluate the innovations in traditional teaching and learning methodology from the students' perspective of a public institution.

METHODS

This descriptive cross-sectional study was conducted at a public sector institute in Karachi. The undergraduate student population of the first to final professional year of medicine and dentistry were included in the study. The study duration was 8 months from January 2024 to August 2024. Sample size determination was performed using "Raosoft Sample Size Calculator ", which calculated a sample size of 282 with a 95% confidence level, a 5% margin of error, and a 50% response distribution based on a population size of 1050. A total of 282 students from both genders participated voluntarily. The sampling technique was non-probability convenience sampling. The ethical approval was taken by the institutional ethical committee of the institute (Ref. no: 049/23). The anonymity and patient details were kept confidential. Medical and Dental undergraduates whose age was between 18-24 years, both genders and students who consented to the study were included. Graduates, post-graduates, faculty members, non-teaching staff and Dental personnel were excluded from this study. The participants provided their verbal informed consent before completing a predesigned questionnaire validated from existing sources and reviewed by subject experts. The data were gathered using two-part Google questionnaire forms. The first section asked for demographic data, including branch (either medicine or dentistry), professional year, and roll numbers. Students' knowledge of the traditional didactic lecture-based teaching style, student learning outcomes, their opinions on the length of each lecture, the quality of the evaluation standards, and the necessary adjustments and

DOI: https://doi.org/10.54393/pjhs.v6i7.3065

modifications to make learning sessions more engaging were all examined in the second part of the questionnaire, and recorded using Likert's scale. Data were analyzed using SPSS version 25.0. Descriptive statistics were computed through frequency and percentage distributions. Comparative analyses were conducted using the chi-square test, with statistical significance set at $p<0.05$. This analytical approach allowed for the detection of significant differences in awareness levels across the various groups examined.

RESULTS

Out of the 282 participants, 118 students, or 41.8% of the total, were from BDS, while 164 students, or 58.2%, were from MBBS (Figure 1).

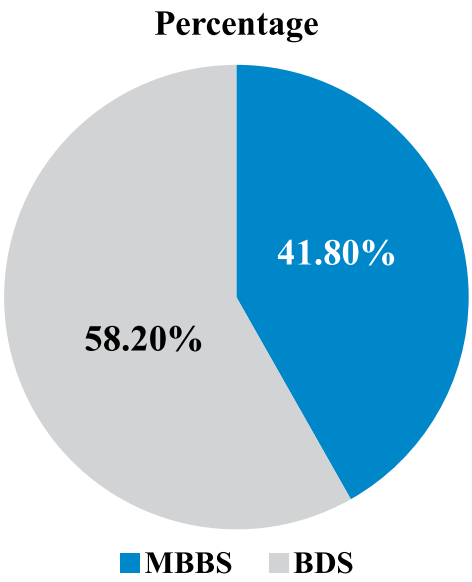

Figure 1: Population Size of MBBS and BDS in the Study

The third-year students responded at the highest rate from the first to the last year, or 27% (n=78) (Figure 2).

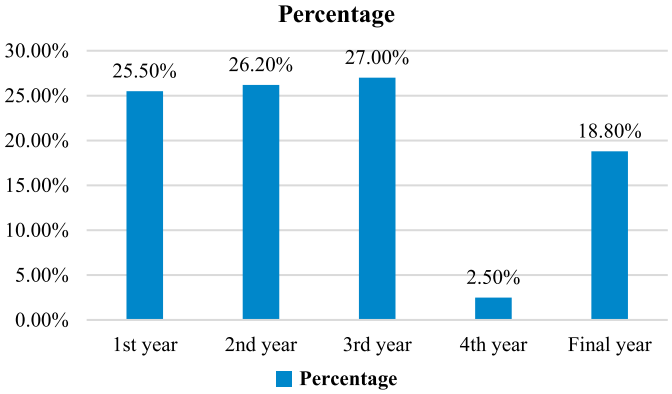

Figure 2: Percentage of Population from First to Final Year

Different questions were asked through a questionnaire to know about students' opinions on different teaching and learning methodologies and evaluation standards. A total of 245 (86.9%) students agreed that learning outcomes (SLOs) must be present with every topic. Approximately 106 (37.6%) population has little to no knowledge about teaching and learning methodologies other than the traditional one. A comparison between traditional and interactive teaching styles showed that most students, 132 (46.8%), prefer interactive lectures compared to the traditional chalk/duster method. A major study population of around 139 (49.3%) thinks that simply using audio-visual has better results than rote learning from textbooks. 119 (42.2%) of students agree that the grading system should be upgraded. Chi-square test was used in order to assess the association among variables ($p<0.05$), but no statistical association was observed (Table 1).

Table 1: Response of Participants to Different Questions

Questions	Options	n (%)	p-Value
Using Student Learning Outcomes (SLO) Before Each Topic	Do Not Consider It Important for Each Topic	21 (7.4%)	1.066
	No Need for SLOS	12 (4.3%)	
	Must Be Present for Every Topic	245 (86.9%)	
	Only for Clinical Subjects	4 (1.4%)	
Awarenes of Teaching / Learning Methods Other Than Conventional	Little Knowledge About Other Methods	106 (37.6%)	1.210
	Yes	100 (35.5%)	
	No	76 (27.0%)	
Preference for Traditional or Interactive Method	A New Method Should Be Introduced	36 (12.8%)	1.649
	Both Are Equally Effective	102 (36.2%)	
	Interactive Session	132 (46.8%)	
	Traditional Method	12 (4.3%)	
Ideal Time for Each Lecture	1 Hour with 15 Minutes of Revision	25 (8.9%)	1.385
	45 Minutes with 15 Minutes Revision	151 (53.5%)	
	30 Minutes with Revision in the Next Lecture	36 (12.8%)	
	45 Minutes With Revision in the Next Lecture	70 (24.8%)	
Question / Quizzes Involving Critical Thinking Should Be Added to the Module or Not	No	8 (2.8%)	0.907
	Yes	212 (75.2%)	
	Non-Clinical Subjects Should Include These	13 (4.6%)	
	Only Include in the Clinical Subject	49 (17.4%)	
Use of Audio / Visual and Chalk Duster Method Have The Same Result	Both Should Be Used Together	110 (39.0%)	1.463
	Audiovisual Is Better of Visual Presentation	139 (49.3%)	
	Traditional Is Better	14 (5.0%)	
	Level of Understanding Same	19 (6.7%)	
Need for Further Enhancement in the Evaluation Standard	Grading on Yearly Performance	63 (22.3%)	1.478
	Newer Grading Method for Viva/ Theory Evaluation	59 (20.9%)	
	The Current Method Is Sufficient	41 (14.5%)	
	The Grading System Should Be Upgraded	119 (42.2%)	
Preference in Teaching / Learning Methodology	Chalk And Talk with the Professor	48 (17.0%)	1.314
	Interactive Session	182 (64.5%)	
	Overhead Presentation by the Teacher and the Students	23 (8.2%)	

DOI: https://doi.org/10.54393/pjhs.v6i7.3065

	PowerPoint Presentation by the Teacher	29 (10.3%)	
Need for Change in the Environment of Study	Introduce A Clinical Environment for Students	98 (34.8%)	1.232
	Environment Is Acceptable	7 (2.5%)	
	Upgradation with Advancement in the Field	54 (19.1%)	
	Activities with Application of Knowledge	123 (43.6%)	
E-Learning Tool Or books?	Books Require Revision E Learning Is Self-Modifying	75 (26.6%)	0.616
	Both Are Equally Effective Methods	55 (19.5%)	
	E Learning Is Preferred in This Era	135 (47.9%)	
	Books Are an Authentic Source	17 (6.0%)	

Duration of lecture plays a vital role in learning factor, and whatever the method is, once a saturation level of understanding is reached, students tend to lose interest. The most highly favoured duration of lecture was 45 minutes' lecture with 15minutes of revision, opted by the student population of 159 (56.4%). Critical thinking and intellectual study are very important in every field to understand and excel in it. Approximately 212 (75.2%) agreed that questions involving critical thinking should be added in quizzes and monthly tests. Advancement in technology has provided new insight into learning style, using audio/ visual aids in addition to textbook learning helps enhance the concepts and solidify the fundamentals. However, a major study population of around 139 (49.3%) thinks that simply using audiovisual aids has better results than rote learning from textbooks. The grading system is very crucial to check a student's ability to grasp concepts and implement whatever is learned in the correct way. Over the years, there has been no significant change in grading and evaluation standards. 119 (42.2%) of students agree that the grading system should be upgraded. Different teaching methods have been introduced to make the process of learning more interesting and encouraging for students. Different options like (traditional chalk and duster method, interactive students' /teacher method, overhead presentation by teacher and students or simply lecture presentation only by teacher) are more or less different approaches converging towards the same method. In our study, about 182 (64.5%) emphasized more towards interactive student/teacher method. Over the years, a primitive environment for study has been a major reason for hindrance to quality learning. 123 (43.6%) populace for research corresponds by opting that activities that centers on the application of knowledge should be incorporated into this setting, similarly, in this era, E-Learning is navigating its way and proving to be more beneficial for students in terms of gathering more erudition and skill set. 135 (47.9%) medical and dental students favoured E-learning over textbooks (Table 2).

Table 2: Response of Participants Concerning Year of Study

Questions	Most Chosen Option	1st Year	2nd Year	3rd Year	4th Year	Final Year	Total
Incorporation of student learning outcomes (SLO) before each topic	Must be present for every topic.	66	57	68	7	47	245
Awareness of Teaching / Learning Methods Other Than Conventional	Little knowledge about other methods.	24	33	34	3	12	106
Preference for traditional or interactive method	Interactive session	34	34	37	4	23	132
Ideal time for each lecture	45 minutes with 15 minutes revision	44	38	40	4	25	151
Question / quizzes involving critical thinking should be added to the module or not	Yes	57	51	56	5	43	212
The use of audio / visual and chalk duster methods has the same result	Both should be used together	35	33	43	2	26	139
Need for further enhancement in the evaluation standard.	The grading system should be upgraded.	34	32	32	2	19	119
Preference in teaching/learning methodology	Interactive session	41	49	45	5	42	182
Need for change in the environment of study	Activities with application of knowledge.	28	33	35	4	24	123
E-learning tool or books?	E learning is preferred in this era	33	33	41	4	24	135

DISCUSSION

The research paper evaluates innovations in traditional teaching and learning methodology from the perspective of students in a Medical and Dental College in Karachi. Dental students participated more than medical students, and the specific year of study in which they participated more was from third professional year. In a recent study, the third professional year contributed the most responses, and dentistry students participated at a higher rate than medical students. This tendency might be a result of students' heightened clinical and academic demands at this point, which encourages them to investigate effective learning resources like e-learning [8]. Research indicates that as students' progress in their education, their use of digital resources rises, underscoring the changing requirements of students during their clinical years. There are many methods to summarize the topics for studying and deeply understanding the concept, and one of the very effective ways is the incorporation of student learning outcomes (SLOs) in students' yearly curriculum. About

DOI: https://doi.org/10.54393/pjhs.v6i7.3065

86.9% students comment that SLOs must be present for every topic. According to a recent survey, 86.9% of students stressed that each topic should have its Specific Learning Outcomes (SLOs). SLOs aid in defining learning objectives, directing study activities, and improving academic achievement. According to research, having well-defined goals enhances student participation [9]. An organized and outcome-based approach to medical and dental education is ensured by including SLOs in curriculum preparation. The finding that 37.6% of students lacked awareness of alternative teaching styles highlights a significant gap in their educational experience. This suggests a continued reliance on traditional methods, limiting exposure to modern strategies such as problem-based learning, flipped classrooms, and digital tools. Without awareness, students cannot fully benefit from active learning techniques that enhance engagement and understanding. Institutions should conduct orientations or workshops to introduce these methods and encourage student involvement. Creating awareness can improve academic outcomes and make learning more effective and meaningful [10]. According to our research, more than half of the study population thought that the duration of class should be about 45 minutes of lecture with 15 minutes of revision. This result is consistent with educational research that indicates shorter, more concentrated sessions are more beneficial because students' attention spans tend to decrease beyond 45 minutes [11]. A revision period improves retention, promotes active recall, and serves to reinforce important ideas. A high percentage of our study population understands and agrees that questions involving critical thinking and intellect should routinely be a part of basic quizzes and assessments to change their pattern of study and learning. After examination comes the evaluation of students, which is equally important to know the academic standing of each student within the class [12]. The most commonly used method is examinations in the form of theory. OSCE and Viva are taken annually or biannually. Use of audio/visual and chalk duster methods has the same result. Digital technology has been incorporated into medical and dental education through the use of Google Forms for response collection, live streaming on YouTube, video lectures, problem-based and clinical-based learning, and more. Digital technological advancements will pave the path for a revolution in dentistry and medical education by enabling personalized, interactive, and effective learning [13]. Due to a lack of application of newer techniques to deep-rooted methods, many students of our study population showed that they have little to no knowledge about different teaching and learning styles. There is a growing need to enhance evaluation standards in medical and dental education. Exams, whether theory or viva, are essential to assess a student's knowledge and capabilities. Clinical reasoning, especially in fields like physical therapy, involves critical thinking and self-reflection, making it challenging to teach and evaluate [14]. As examination patterns evolve, Pakistani medical institutions should focus more on critical thinking and problem-based questions. A curriculum that promotes clinical problem-solving, scientific reasoning, and communication skills is vital for lifelong learning [15]. A similar percentage of students highlighted the importance of having a clinical environment to apply theoretical knowledge for a deeper understanding. Effective blended learning or e-learning depends on accessible online platforms for both educators and students [16]. Traditionally, medical education relied on in-person lectures and printed materials. However, with the rise of the internet, modern curricula have expanded to include digital, online-supported teaching methods, enhancing the learning experience through e-learning [17]. Medical and dental students are encouraged to shift from traditional classroom methods to e-learning due to several advantages. E-learning increases accessibility by removing geographic barriers and offers flexible, self-paced learning tailored to individual styles [18]. It also reduces costs by minimizing the need for physical infrastructure and printed materials [19]. Additionally, interactive multimedia and simulations enhance engagement and retention, while global collaboration exposes students to diverse perspectives. Overall, e-learning supports adaptability to evolving educational and technological needs. A change in educational patterns is shown in medical and dentistry students' increasing preference for e-learning resources. A total of 135 (47.9%) of students in a recent research study preferred online learning to traditional textbooks, underscoring the need for learning systems that are flexible, interactive, and easily available [20]. Digital resources improve engagement and information retention by providing self-paced modules, multimedia content, and instant feedback. Research showed that the COVID-19 pandemic hastened this change even more [21]. While textbooks remain important, a blended learning approach may offer optimal outcomes. The teaching of untouched aspects of dentistry, like forensic odontology, also adds an interesting domain for the students [22]. Since each Chi-square value is less than the critical threshold for its degree of freedom, none of the questions exhibit statistically significant differences at the $p<0.05$ level. A comparatively homogeneous group in terms of educational exposure, experience, or institutional practices may be reflected in the consistency of the

DOI: https://doi.org/10.54393/pjhs.v6i7.3065

responses. Several patterns are noteworthy for their instructional value, even though the results were not statistically significant. There is substantial support for outcome-based education, as seen by the great majority of respondents (86.9%) who agreed that SLOs must be included for every topic. In the same way, 46.8% of respondents preferred interactive sessions over standard lectures, which is consistent with contemporary pedagogical trends that prioritize active learning. Approximately 53.5% of respondents preferred a 45-minute lecture with 15 minutes for revision after being asked how long they thought lectures should last. This distribution may help with curriculum preparation by pointing out a realistic time frame that promotes student attention spans [23] and information reinforcement, even if it is statistically non-significant. Despite the lack of significant diversity in responses, an adequate number of respondents (75.2%) supported the inclusion of critical thinking-based exams in all topics, demonstrating a broad appreciation of their function in cultivating analytical skills. The question of learning materials (e-learning vs. books) showed a preference for self-modifying resources (26.6%) and e-learning tools (47.9%), indicating an increasing trend toward adaptable, technologically enhanced learning environments [24, 25]. However, only 6% of respondents still valued traditional textbooks, highlighting the importance of using resources in a balanced manner. Overall, the patterns suggest a continuing shift in educational preferences toward interactive, learner-centred, and technologically integrated approaches, although no statistically significant differences were found. Even in the absence of statistically significant answer groups, these findings can help educators and curriculum creators match instructional tactics to student expectations.

CONCLUSIONS

It was concluded that utilizing the learned concepts and converting them into applied knowledge is more beneficial for students; thus, refinement in medical education is key to producing more skillful and accomplished doctors more quickly.

Authors Contribution

Conceptualization: MK, MM, MAK, FT, AS, ABKK
Methodology: MK, MM, MAK, FT, AS, ABKK
Formal analysis: MK, MM, MAK
Writing review and editing: MK, FT, AS, ABKK

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Park JC, Kwon HJ, Chung CW. Innovative Digital Tools for New Trends in Teaching and Assessment Methods in Medical and Dental Education. Journal of Educational Evaluation for Health Professions. 2021 Jun; 18. doi: 10.3352/jeehp.2021.18.13.

[2] Zhao B and Potter DD. Comparison of Lecture-Based Learning Vs Discussion-Based Learning in Undergraduate Medical Students. Journal of Surgical Education. 2016 Mar; 73(2): 250-7. doi: 10.1016/j.jsurg.2015.09.016.

[3] Pyle M, Andrieu SC, Chadwick DG, Chmar JE, Cole JR, George MC *et al.* The Case for Change in Dental Education. Journal of Dental Education. 2006 Sep; 70(9): 921-4. doi: 10.1002/j.0022-0337.2006.70.9.tb04162.x.

[4] Romanelli F, Bird E, Ryan M. Learning Styles: A Review of Theory, Application, And Best Practices. American Journal of Pharmaceutical Education. 2009 Feb; 73(1). doi: 10.5688/aj730109.

[5] Sadler-Smith E. Learning Styles: A Holistic Approach. Journal of European Industrial Training. 1996 Oct; 20(7): 29-36. doi: 10.1108/03090599610127891.

[6] Shukr I, Zainab R, Rana MH. Learning Styles of Postgraduate and Undergraduate Medical Students. J Coll Physicians Surg Pak. 2013 Jan; 23(1): 25-30.

[7] Kashif M, Raja IM, Rehman A, Iqbal S, Baig MH, Aleem A. Exploring Factors Influencing Females Decision to Pursue Medical and Dental Education in Karachi, Pakistan: A Cross-Sectional Analysis. Pakistan Journal of Medical Research. 2023; 62(4): 163-8

[8] Munna AS and Kalam MA. Teaching and Learning Process to Enhance Teaching Effectiveness: A Literature Review. International Journal of Humanities and Innovation. 2021 Mar; 4(1): 1-4. doi: 10.33750/ijhi.v4i1.102.

[9] Aldrup K, Carstensen B, Klusmann U. Is Empathy the Key to Effective Teaching? A Systematic Review of Its Association with Teacher-Student Interactions and Student Outcomes. Educational Psychology Review. 2022 Sep; 34(3): 1177-216. doi: 10.33750/ijhi.v4i1.102.

[10] Nilson LB and Zimmerman BJ. Creating Self-Regulated Learners: Strategies to Strengthen Students' Self-Awareness and Learning Skills. Routledge. 2023 Jul. doi: 10.4324/9781003443803.

DOI: https://doi.org/10.54393/pjhs.v6i7.3065

[11] Gutiérrez-González R, Royuela A, Zamarron A. Student Engagement in A Flipped Undergraduate Medical Classroom to Measure Optimal Video-Based Lecture Length. Medical Education Online. 2025 Dec; 30(1): 2479752. doi: 10.1080/10872981.2025.2479752.

[12] Lee K and Fanguy M. Online Exam Proctoring Technologies: Educational Innovation or Deterioration? British Journal of Educational Technology. 2022 May; 53(3): 475-90. doi: 10.1111/bjet.13182.

[13] Chowdhury PN, Vaish A, Puri B, Vaishya R. Medical Education Technology: Past, Present and Future. Apollo Medicine. 2024 Dec; 21(4): 374-80. doi: 10.1177/09760016241256202.

[14] Hantoobi S, Wahdan A, Al-Emran M, Shaalan K. A Review of Learning Analytics Studies. Recent Advances in Technology Acceptance Models and Theories. 2021 Mar: 119-34. doi: 10.1007/978-3-030-64987-6_8.

[15] Ahmed Y, Taha MH, Khayal S. Integrating Research and Teaching in Medical Education: Challenges, Strategies, and Implications for Healthcare. Journal of Advances in Medical Education and Professionalism. 2024 Jan; 12(1): 1.

[16] Ngoasong MZ. Curricsulum Adaptation for Blended Learning in Resource-Scarce Contexts. Journal of Management Education. 2022 Aug; 46(4): 622-55. doi: 10.1177/10525629211047168.

[17] Charbonneau-Gowdy P, Salinas D, Oyanedel JC, Magaña H. Designing the' New Normal': Key Insights from the Pandemic for Transforming Online Learning Going Forward. Contemporary Educational Technology. 2023 Jul; 15(3): ep446. doi: 10.30935/cedtech/13389.

[18] Kashif M, Shaikh A, Najmi N, Iqbal A. Dental Post Graduate Educational Programmes Preferences in Pakistan and Factors Affecting It: A Cross-Sectional Survey Conducted at Karachi, Pakistan. Pakistan Journal of Medical Research. 2019 Apr; 58(2).

[19] Abbas U, Parveen M, Sahito FS, Hussain N, Munir S. E-Learning in Medical Education: A Perspective of Pre-Clinical Medical Students from A Lower-Middle Income Country. BioMed Central Medical Education. 2024 Feb; 24(1): 162. doi: 10.1186/s12909-024-05158-y.

[20] Kiesewetter J, Sailer M, Jung VM, Schonberger R, Bauer E, Zottmann JM *et al.* Learning Clinical Reasoning: How Virtual Patient Case Format and Prior Knowledge Interact. BioMed Central Medical Education. 2020 Mar; 20(1): 73. doi: 10.1186/s12909-020-1987-y.

[21] Almarzooq ZI, Lopes M, Kochar A. Virtual Learning During The COVID-19 Pandemic: A Disruptive Technology in Graduate Medical Education. Journal of the American College of Cardiology. 2020 May; 75(20): 2635-8. doi: 10.1016/j.jacc.2020.04.015.

[22] Kashif M, Kamran MA, Rizwan S, Iqbal S, Aslam A, Shifa S. Awareness of Dental Students About Forensic Odontology in Karachi, Pakistan. Journal of Oral Health and Oral Epidemiology. 2020 Jul; 9(3): 49-55.

[23] Frenk J, Chen L, Bhutta ZA, Cohen J, Crisp N, Evans T *et al.* Health Professionals for a New Century: Transforming Education to Strengthen Health Systems in an Interdependent World. The Lancet. 2010 Dec; 376(9756): 1923-58. doi: 10.1016/S0140-6736(10)61854-5.

[24] Singh K, Srivastav S, Bhardwaj A, Dixit A, Misra S. Medical Education During the Covid-19 Pandemic: A Single Institution Experience. Indian Pediatrics. 2020 Jul; 57(7): 678-9. doi: 10.1007/s13312-020-1899-2.

[25] Subedi S, Nayaju S, Subedi S, Shah SK, Shah JM. Impact of E-Learning During the COVID-19 Pandemic among Nursing Students and Teachers of Nepal. International Journal of Science and Healthcare Research. 2020 Sep; 5(3): 68-76.