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Understanding Student Engagement And Satisfaction With Chatgpt In Dental Education: A Qualitative Exploration

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Abstract

Objective: The study aimed to explore the engagement and satisfaction levels of dental students in Pakistan using ChatGPT as a supplementary learning tool.

Method: Thematic analysis was conducted on qualitative data from semi-structured interviews with dental students. A purposive sampling strategy was employed to select participants, and data were collected through in-depth interviews until saturation. The data were analysed using the Bran and Clarke framework to identify key themes and sub-themes related to students' perceptions and experiences with ChatGPT.

Results: The thematic analysis revealed several key themes and sub-themes related to students' engagement levels and satisfaction with ChatGPT. Themes included perceived utility, ease of access, interactive learning experience, relevance to learning needs, user interface experience, confidence in responses, personalisation of learning, challenges with ChatGPT (language barriers, technical issues, lack of human interaction, content limitations), and suggestions for improvement (language support, technical assistance, enhanced content generation, integration with classroom instruction).

Conclusion: The findings highlighted the perceived utility and relevance of ChatGPT to students' learning needs. However, challenges such as language barriers, technical issues, and content limitations indicate areas for improvement. By addressing these challenges and incorporating suggestions for enhancement, ChatGPT has the potential to play a valuable role in dental education, complementing traditional teaching methods and preparing students for the future of dentistry.

MeSH Keywords: Artificial Intelligence, Education, Natural Language Processing, Qualitative study.

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1. Introduction

The development of modern technologies, such as e-learning, along with innovations in teaching methodologies, such as the flipped classroom and the integration of artificial intelligence (AI), have significantly influenced the new trends in education in recent years.[1] In these landscape developments, dental education is a field that is ready to change because the focus is on the comprehension of theoretical concepts along with the direct practice of developing clinical skills.[2]

The implementation of AI in the classroom has altered the traditional approach to teaching methodologies in a way that is engaging and innovative by enhancing the strategies for stimulating student satisfaction.[3] Among the learning fields that have benefited from such a technical advancement, dental education has been considered very relevant.[4]

This has been possible in the current era because education has tremendously transformed with the help of artificial intelligence, making it easier for anyone to access quality learning materials regardless of their geographical location. Students from remote areas and those who are underprivileged or marginalised can take tremendous advantage of this, where trained and qualified teachers are not accessible. AI-based technologies like ChatGPT thus deliver not only a personalised approach that adheres to the learning needs of each learner but also makes education more accessible and attainable for the students regardless of the location they are in.[5,6] Thus, artificial intelligence can be expected to influence the existing traditions of teaching and learning in the context of the healthcare education continuum, where information and knowledge are related to and build on clinical competencies and critical thinking. Hence, diverse methods of teaching and learning must be applied to dental education, particularly in tackling difficult cognitive-level problems.[7]

AI technology has been applied in dentistry education to enable and complete higher cognitive tasks. Examples of these technologies are intelligent tutoring systems for individualised learning and virtual simulations for procedural teaching. These developments have improved learning not only but also made evaluation and feedback procedures easier, which has encouraged a culture of ongoing

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development among students.[8] Through the application of AI, teachers may give students fully immersive learning environments that mimic real-world situations, integrating theory and practice.[9]

Among the AI technologies potentially applicable to education, the most flexible and high-potential is the NLP model called ChatGPT, developed by OpenAI. ChatGPT is a conversational model that emulates human-like conversations with appropriate knowledge and interactive learning.[10] It is a type of education technology that, in contrast to other types, can provide customised interaction in which the programme utilises the user's knowledge while also learning from it and providing pertinent information. Therefore, it can prove to be a more appropriate means for redesigning the whole landscape of medical and dental training and learning.[11]

Previous studies have also focused on the impact of the utilisation of AI in educational models for medical specialities on student outcomes and found it to have positive effects on knowledge acquisition among the students and the level of satisfaction.[8] Globally, numerous studies have highlighted the efficacy of ChatGPT in terms of self-directed learning, critical thinking skills, and academic achievement.[10] However, the majority of these studies have been conducted in Western countries, thus leaving a gap in how such technologies can be scaled in diverse cultures.

Therefore, this research aims to explore the students' engagement and satisfaction with the use of ChatGPT as a supplementary learning tool. This will assist in determining the feasibility and effectiveness of the integration of the various technologies in the artificial intelligence field into dental curricula.

2. Materials & Methods

The research employed a qualitative exploratory study design. The study was conducted across multiple dental colleges in south Punjab Pakistan to ensure a diverse representation of participants.

A criterion-based purposive sampling technique was utilized to select participants having experience using ChatGPT in their dental education. This approach ensured that participants possessed relevant insights related to the interview. Efforts were made to include participants from different academic years and demographic backgrounds to capture a broad range of perspectives.

The participants consisted of dental students currently enrolled in undergraduate programs at the selected dental colleges in Pakistan. Students who were regularly using and familiar with ChatGPT, who provided informed consent for participation in the study & dental students currently enrolled in undergraduate programs were included in the study.

Dental students unfamiliar with ChatGPT who refused to provide informed consent or participate in interviews & Dental interns house officers or students who just passed/cleared the final exit exam were excluded from the study.

The data was gathered from the participants through semi-structured interviews. The interviews mainly focused on students' activities and their perceived levels of satisfaction when using ChatGPT in dental education. The interview guide was designed in line with the study objectives through a literature review focusing on areas of engagement, satisfaction, factors affecting usage, and incorporation into the curricular domains. This research employed an interview guide that was field-validated by experts in the field. Their insightful responses have been carefully considered to enhance the clarity and representation of the questions. After that, the pilot test phase was conducted with the selected participants to check the interview guide's understandability and relevance. As a result of this pilot test, changes and improvements regarding the wording and format of the questions needed to be made to make the text clearer and more organised.

The interviews were audio-recorded with participants' consent to ensure accuracy in data capture. Field notes were taken during the interviews to capture additional insights and observations. The interviews were conducted in a private (in-person) and comfortable setting to facilitate open and candid discussions. The average time duration for the interview was 29 minutes. A total of 28 participants agreed and signed informed consent to participate. The process of analysis and data collection was carried out simultaneously, and the interviews concluded with 19 participants after data saturation.

Thematic analysis was employed to analyze the interview data. For the analysis of the qualitative data obtained from the interviews, an inductive coding approach was utilized. Braun and Clarke's framework was utilized for the analysis of the data. The analysis was conducted manually to ensure rigour and depth in capturing the nuances of participants' experiences. The research team crosschecked emerging themes to ensure inter-coder reliability.

Ethical approval was obtained from the institutional review board (IRB) before the commencement of data collection. Informed consent was obtained from all participants, emphasizing voluntary participation, confidentiality, and the right to withdraw from the study at any time. Participants' anonymity and privacy were maintained throughout the research process, and all data was securely stored and accessible only to authorized personnel.

3. Results

The thematic analysis of qualitative data revealed multifaceted insights into the engagement and satisfaction of dental students with ChatGPT as a supplementary learning tool in the Pakistani context. The analysis identified 4 categories and 15 themes.

Engagement with ChatGPT:

Some students expressed the perceived benefits of ChatGPT as a quick way to access information and for interactive learning experiences. Some of them also mentioned increased convenience through easy access to ChatGPT and a friendly user interface to increase the engagement level of students as well as improve the extra learning resources they could use.

Satisfaction with ChatGPT:

Students expressed satisfaction with ChatGPT's content as it was relevant to their learning needs, provided personalised learning experiences, and provided confidence in the accuracy of responses. However, challenges including language barriers, technical issues, a lack of human interaction, and content limitations were identified as areas for improvement.

Table 1: Thematic Analysis

Categories	Themes	Representative Quotations
Engagement with ChatGPT	Perceived Utility	"I found ChatGPT helpful in providing quick answers to my queries during study sessions, especially when I needed clarification on complex topics, even I was unable to comprehend from teachers notes"P3
	Ease of Access	"Using ChatGPT was convenient for me as I could access it anytime, anywhere, even during breaks or while commuting to and from college.ChatGPT made me feel that we don't need now to just memorize every basic thing" P6
	Interactive Learning Experience	"The interactive nature of ChatGPT allowed me to engage in meaningful conversations and explore different perspectives on dental topics. It helped me customize my instructions to find better solutions"P4
Satisfaction with ChatGPT	Relevance to Learning Needs	"ChatGPT's ability to generate dental-related content tailored to our curriculum made it relevant and valuable for enhancing my understanding. Whatever I asked from it feels like fits perfectly to my assignments"P16
	User Interface Experience	"The user interface of ChatGPT was intuitive and easy to navigate, as I am a non-tech person yet it made it very easy for me to complete my tasks in no time."P19
	Confidence in Responses	"I felt confident in the accuracy of the responses generated by ChatGPT, which encouraged me to rely on it for supplemental learning and revision. Moreover, with extensions, it is all in one package providing data and the sources of information too"P18
	Personalization of Learning	"ChatGPT's ability to personalize learning content based on my preferences and learning style enhanced my overall learning experience."P8
Challenges with ChatGPT	Language Barrier	"As a non-native English speaker, I sometimes encountered language barriers while using ChatGPT, which affected my comprehension of the responses."P11
	Technical Issues	"I faced occasional technical glitches while using ChatGPT, such as slow response times or server errors, which disrupted my learning flow, particularly after 11 PM."P7
	Lack of Human Interaction	"While ChatGPT provided valuable information, it cannot supplement human interaction and engagement. I easily get bored with it"P5
	Content Limitations	"There were instances where ChatGPT struggled to generate accurate responses for complex and specific tasks/assignments related to major data entry, leading to frustration and reliance on alternative sources."P1
Suggestions for Improvement	Language Support	"Providing multilingual support and language customization options in ChatGPT would enhance accessibility and usability for patients-related tasks."P10
	Technical Assistance	"Establishing a dedicated technical support system for troubleshooting ChatGPT-related issues would alleviate user frustrations and improve overall user experience."P2
	Enhanced Content Generation	"Expanding the database and improving the algorithm of ChatGPT to generate more accurate and contextually relevant responses for dental topics would enhance its utility in education."P14
	Integration with Classroom	"Integrating ChatGPT with classroom instruction through interactive sessions or assignments would foster deeper engagement and application of learning concepts."P12

4. Discussion

This study holds significant implications regarding the level of engagement and satisfaction of dental students in Pakistan with the use of ChatGPT as a supplemental aid. The themes are coherent with the current educational patterns of dental institutions, particularly the tendency to integrate online technologies into learning processes and utilise tools such as ChatGPT.

The increasing significance of online learning in health professions education, notably in dental education, has led to a change in teaching and learning methods towards more student-friendly options, especially in response to the COVID-19 pandemic. The advantages of online modalities, such as student-centred learning and easy management during lockdowns, resonate with the perceived utility and ease of access highlighted by participants in this study. The findings of the study align with another study conducted in 2024, which also emphasized high satisfaction and compliance with online learning tools.[2]

Participants expressed contentment with the utilisation of ChatGPT due to its provision of very pertinent data for the assigned tasks. The participants valued the user interface experience for its ability to tailor to their requirements. Prior research has also emphasised that the precise and accurate information flow of AI technologies is improving as a result of constant feedback and refinement processes.[12]

The study highlighted several challenges, including language barriers, technical issues, and content limitations. These challenges emphasized the importance of ongoing enhancements and adjustments to online learning tools. The study, therefore, emphasized the necessity of offering a free or low-cost version of these tools for students from developing countries such as Pakistan, to effectively address their needs. The findings of a previous study conducted in 2023, also stated that developing countries and international funding organizations must allocate resources towards the enhancement of contemporary educational resources for students in low-income countries, to foster social justice.[13]

The suggestions for improvement provided by participants align with the study that emphasized that enhancing language support, technical assistance, and content generation capabilities in ChatGPT will increase its efficacy.[14]Additionally, integrating ChatGPT with classroom instruction to foster deeper engagement and learning outcomes reflects the importance of combining online learning tools with traditional teaching methods for comprehensive education delivery.[15]

Participants believed that ChatGPT excels in certain areas, like essay writing and content generation. However, its limitations in addressing complex dental concepts related to data management, application, and tabulations highlight the need to consider multiple AI tools to meet diverse learning needs. A study conducted in 2023 highlighted the limited potential of ChatGPT 3.5 for managing these types of tasks. However, the latest 4.0 version is much more reliable, faster, and better.[16]

These findings extend the current body of knowledge on the application of artificial intelligence in dental education. By exploring the satisfaction levels of students with the ChatGPT, medical educators can design and incorporate it into dental curricula. However, challenges and affirmative prerequisites for development must be addressed to fully harness AI and apply it within dental education so that students are ready for the future of dentistry.

Limitations

Despite the insightful information this study provided, several limitations must be noted. First off, the qualitative character of the study could prevent the conclusions from being applied in situations other than the dentistry education context in Pakistan. The size and makeup of the sample might have also affected the depth and breadth of the data gathered. Finally, the study just considered the attitudes of the students; to give a more thorough picture of ChatGPT's influence on dentistry education, future studies should include the opinions of faculty members.

5. Conclusion

Benefits like the perceived effectiveness of ChatGPT, general availability, and relevance for fulfilling students' educational needs emerged in this study. However, some challenges, like linguistic issues, technical issues, and limitations in content, may serve as areas that can be improved. By effectively addressing these challenges and incorporating suggestions for improvement, ChatGPT can play an important role in the context of dental education, which could support traditional teaching and learning and prepare students for

further advances in the domain of dentistry. Hence, more comprehensive and subsequent research must be conducted to take advantage of ChatGPT or other similar AI applications and tools for integration into the current dental curriculum.

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