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Exploring Biochemistry Teachers' Perceptions and Experiences of Using Chatgpt in Undergraduate Medical Education

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ABSTRACT

The aim of this qualitative research was to explore how medical educators think about and have experienced the integration of an AI language tool (ChatGPT) introduced at private universities into undergraduate medical education. Findings: twenty-five academic faculty members of the faculties of Private Medical Institutions of Pakistan in Lahore were interviewed using in-depth interviews that continued until data saturation, coded and developed categories. Thematic analysis revealed six primary themes: ChatGPT within pedagogic provision, perceptions of generalizability, pedagogic benefits, concerns and constraints, faculty development requirements and recommendations for in-house use. Participants identified the potential of ChatGPT for increasing learner engagement, helping students develop clinical reasoning and encouraging degree of self-directed learning. But at the time there were also fears students would become too dependent on AI, inaccuracies in material, digital poverty and a lack of region-specific medical knowledge. Teachers believed that there should be formalized professional development opportunities and policies for the conscientious integration of these tools. The work implies that, though ChatGPT as an educational assistive tool – seems to have promise, the rollouts must be adequately contextualized based on local pedagogic-ethical-infrastructural considerations. This work contributes to the ongoing discussion about the challenges presented by AI in medical education and provides some practical direction for policymakers, educators, and technologists.

Introduction

Nowadays, artificial intelligence use is increasingly seen in medical education which is both beneficial as well as challenging for teachers and students. Various types of available artificial intelligence tools like ChatGpt play an important role in making teaching and learning process effective for medical students and teachers. AI provides individualized teaching, assessment process and tend to be effective teaching tools which are quite economical and provide more value for money especially in education field.

Hence, the present study's aim was to explore the perceptions of biochemistry teachers regarding the use of ChatGPT in private medical colleges. The objective of the study was to determine how teachers use artificial intelligence in their teaching, and what challenges they encounter. The findings of the present study

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will generate evidence-based policies for proper embedding of AI within medical curricula to improve quality of teaching and enhance student preparedness in contemporary healthcare.

Literature Review

The use of Artificial intelligence in education has changed the educational landscape, making pedagogical approaches more effective and altogether creating a dynamic learning environment. An advanced language model like ChatGPT can be used to generate human-like responses and its use has tremendously increased in the education sector. ChatGPT can perform multifunctional and versatile tools that help in making learning process interactive and helps in real time content sharing

Introduction to AI tools and turn in Education

With the emergence of advanced artificial intelligence tools — most notably ChatGPT — in education, educators are facing a fundamental shift towards the hybridization of teaching methodologies; requiring that we embrace an interdependent relationship between AI and traditional teaching models. This convergence necessitates a departure from traditional and passive learning paradigms that must transform into dynamic, AI-augmented educational models capable of supporting personalized and self-directed learning environments (Aruleba et al., 2023). ChatGPT, which can instantly explain complex ideas, gives students the opportunity to pave their own way to mastering a subject while revolutionizing how we determine comprehension and deliver content (Mogavi et. al. 2023).

AI-based educational tools are developing rapidly, and with the emergence of platforms like ChatGPT4, educators and institutions will need to engage with and understand how they will be beneficial to learning (Gill et al., 2023). The use of ChatGPT for classroom instruction marks a paradigm shift in pedagogical approaches, leading teachers to integrate AI with traditional pedagogy. This mixed method demands a shift from passive learning to a more AI-empowered and AI-enriched way of education. ChatGPT helps in individualized learning and students are able to grasp complex concepts easily, leading to a transformation in the assessment system and the way knowledge is imparted to students.

The application of ChatGpt in the role of classroom teacher has set a new standard to integrate in the old traditional method of teaching. AI tools promote independent learning and have made the passive learning process more active and productive.

Constructivist Learning and Pedagogical Benefits

AI use has made learning more personalized and accessible and at the same time it supports individuality in a world where inclusivity, equality, and diversity are core values, with great benefits especially in the educational context. AI tools can be used for differentiated and adaptive learning systems which can be used to monitor students' progress so that necessary adjustments can be made based on performance. (Gill et al., 2023). However, a challenge is faced while maintaining a balance between personalized learning and teaching job related skills for today's job market which AI classrooms are trying to resolve.

Challenges and ethical issues

Are there problems with ChatGPT, highlighting its risks despite its benefits? Faculty needs to keep in mind the limitations of the tool such as potential factual errors and the importance of contextualization (Huesca et al., 2024). There also exist ethical issues including academic malpractice, algorithmic bias, and data privacy[6 7] (Domènech, 2023; Tanjga, 2023). These issues emphasize the need for clear usage policies and continuing education for educators to ensure responsible integration.

With the introduction of this AI, the mere usage of traditional and didactic approaches might not serve the purpose of maximizing the learning among students and thus educators might need to adopt new roles in the digital landscape integrating products like ChatGPT (Yu, 2024).

Mogavi et al., (2023) concluded that if AI technologies would be used wisely and ethically in education, which would become a game-changer as they would lead to education with high engagement, personalization, and effectiveness, preparing the rising generation with essential skills which would prepare them to survive in an increasingly complex and advanced global community.

Pakistani Local Context: Overview of Medical Education in Pakistan

Although a lot of progress has been made in the curricula of medical colleges, even then, number of systematic barriers such as outdated curricula, lack of digital resources, and lack of professional development opportunities still exist. Students are expected to master theories and acquire practical skills in an environment that has not been upgraded pedagogically. This gap highlights the important role of AI tools like ChatGPT can play in providing information and thus improving learning outcomes and overcoming the scarcity of resources.

By integrating AI tools like ChatGPT into medical education can be potentially useful in improving the teaching methodologies, performing the assigned of administrative tasks, and research facilities in the

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perspective of medical colleges of Pakistan. How successful this integration will be is dependent on how well the challenges like ethical concerns related to its use, training of the faculty to use AI in their teaching, availability of the infrastructure is addressed (Chang, 2023; Malik, 2021). The integration of AI language models like ChatGPT will mark the beginning of new era in education and simultaneously it is also a time when teachers and students are learning to manage these challenges (Adıgüzel et al., 2023). The strategic use of AI tools can help educational institutions to develop personalized, dynamic learning environments where students work according to their full potential and compete in the digital age (Rueda et al., 2023). In such dynamic environment educators and institutions should work together and provide clear rules and education programmes where AI technology is used responsibly and effectively which will not only enhance their learning but will also maintain academic integrity.

Method

The present research employed a qualitative research design to explore the perspectives of biochemistry teachers and their experience with ChatGPT. For the purpose of diversity in teaching experience as well as qualifications, the twenty-five participants working in private medical colleges based in Lahore, were selected using purposive sampling. Semi-structured interviews were conducted to gather detailed information from the respondents. Each interview lasted for 60 to 90 min and was audio recorded, transcribed and thematically analyzed. This process ensured that the researchers became ingrained in the data, outlining initial codes, developing potential thematic ideas, and refining those themes to ensure they represented the raw data and created an understanding of the participants' individual experiences.

Summary Table:

Figure 1: Thematic Summary of Teachers' Perceptions on Chatgpt Integration

Theme	Key Insights
1. Integration in Teaching	Used alongside Zoom, anatomy apps, and case-based teaching. Aids in PBL.
2. Versatility of ChatGPT	Explain concepts, simulates clinical scenarios, supports real-time Q&A.
3. Learning Advantages	Boosts self-directed learning, enhances reasoning, provides real-time feedback.
4. Challenges & Limitations	Over-reliance, complexity for new learners, lack of localized content.
5. Need for Faculty Training	Importance of workshops, ethics, and AI literacy emphasized.
6. Improvement Suggestions	Localized content, offline versions, and audio-based procedural training.

Findings

ChatGPT Integrated into Medical Education

The growing use of ChatGPT along with other online interactive teaching platforms such as Zoom, 3D anatomy apps and virtual whiteboards to deliver content, clinical simulation, and improve quality of assessment were shared by medical college teachers. The AI technology and online teaching platforms have changed the learning environment, and this combination focuses more on interaction in real time and development of and reinforcement of knowledge. Most of the teachers were of the view that ChatGPT helped in bringing home the complex medical terminology to the students and practice into a form that they could understand it more easily. This is particularly helpful in courses like anatomy and pharmacology, which have lots of content and students find them quite overwhelming. It was also reported by many teachers that using ChatGpt in discussion case studies, especially in PBL-based variables alongside case-based referencing during the discussion tends to be helpful and kept students more active and they posed more thought provoking questions and gained deep insight into the topic.

Majority teachers reported that ChatGPT acted as a "bridge" between theory and practice, where students could engage with complex theoretical concepts independently and get prepared prior to hand on activities. This helps in creating more engaging and interactive classroom activities and discussions. Respondent A stated "It makes difficult medical procedures simple and easy to understand and retain" in the interview, while other respondents appreciated the responsive and personalized nature of AI for a student. But while teachers acknowledge it has its advantage and one must be trained to introduce it in a structured and guided way. Majority respondents viewed that it could be used as a supplement and there is no replacement for hard-won education jobs with decades of pedagogical practice behind them such as expert facilitation, critical dialogue and human mentorship. Instead, it should be considered as an adjunctive tool. Respondent E said, "It is a supportive teaching tool for the medical college teachers and not he replacement

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of traditional teaching pedagogies."

Perceptions of ChatGPT's Versatility

Majority of the teachers viewed ChatGPT as an exceptionally flexible education tool to support a variety of teaching and learning scenarios. Like Respondent F stated, "I like it as it helps in breaking down complex medical topics, into simple easy language and form helps in prompting case discussions and also provides students with quick personalized answers." Majority respondents thought that AI tools unlike traditional textbooks offers more hands-on and self-directed learning experience that can help the medical college student delve into subject matter beyond the conventional methods. One teacher reported, "students like ChatGPT answers because they are immediate, concise easy and relevant as they don't have to spend time going back over information in the pages. Not only this variety of answers in simplest form of language can be generated through it."

However, some teachers viewed that AI's responses would be hit or miss, could be in consistent as the tool simple synthesizes information, and so careful faculty oversight and guidance is necessary when used. This type of use will require judicious faculty oversight and support to ensure that AI is used responsibly and effectively in medical education. Teachers need to critically evaluate and verify the information from credible sources before sharing it with their students. Teachers must teach their students how they should and shouldn't use ChatGPT, and that critical thinking is crucial. Teachers also viewed that monitoring AI-based resources in medical education is required. Like respondent C added, "it is essential to ensure that value added by these resources does not undermine educational experience and the highest standards of integrity are maintained."

Advantages of ChatGPT in Medical Education

Majority of the participants were of the view that ChatGPT in undergraduate medical education with a special emphasis on SD learning contributes to enhance students' clinical reasoning skills. They explained that ChatGPT does this by enabling students to independently explore complex medical topics without the need to be in the classroom, empowering them with their own learning. It was thought that this autonomy was essential in developing important cognitive functions, such as analytic and critical thinking, and clinical decision making.

Multiple participants mentioned that students who regularly utilized ChatGPT were able to ask more questions (curiosity) and provide more sophisticated answers for foundational content (e.g. pharmacology, anatomy, and pathology). "I've seen a change — students aren't just memorizing, they're trying to think about the 'why' behind a diagnosis, and ChatGPT helps them shape those questions," one educator said.

Moreover, the tool facilitated the connection between the theoretical and the practical side, particularly in the field of procedural learning. Educators described how students employed ChatGPT for rehearsal in diagnostic reasoning, review of differential diagnoses, and simulated clinical encounters before performing hands on training or clinical encounters. It was reported that this preparatory use helped in reducing anxiety and supported learners' confidence, enabling students to engage in clinical situations with a heightened conceptual framework. And one participant referred to ChatGPT as "a virtual mentor," which students consult before they interact with real patients, giving them an opportunity to practice their clinical decision-making with confidence. Another teacher observed the tool's pragmatic use: "Some students will go over the procedure with ChatGPT before they actually do the procedure just to make sure, they have the steps in the right order — it's kind of a safety net."

By answering students' questions with nonspecific explanations, clarifications, or examples, the tool has been designed to promote an inquiring type of learning model that supports this iterative process of understanding. They can enjoy more advanced instruction to delve deeper into challenging content, engage in scaffolding dialogue until they find the right answer with no interaction, and rebuild misconceptions on an extremely high level. This form of adaptive engagement supports learners to give more time or attention to the most useful parts of learning materials and so come to learn the subject matter more thoroughly from one study instance, especially when it concerns reflective learning activity or formative assessment. In conclusion, ChatGPT's placement along the learning continuum was consistent with our aspiration to enhance academic independence and scaffold complex clinical reasoning, while supporting a loop difficult to achieve in resource-constrained large classroom settings.

Challenges and Limitations

While there are many possible benefits to ChatGPT, its implementation in undergraduate medical education raises several key challenges and limitations. Of course, one of the biggest concerns that educators have with students using AI tools is that they'll over rely on information they generate. ChatGPT might prove to be a useful learning resource, educators said, but relying too much on its outputs could erode students' skills at independent critical thinking and clinical judgment. The worry is that students could get

too dependent on ChatGPT to cut corners in the cognitive work of creating, analyzing and critiquing complex medical problems. “Students copied from AI-generated answers in their assignment without understanding to it themselves, they trust it too much,” one respondent said.

There was also a second, major problem with the unquestioning use of ChatGPT’s responses. Many of the students — particularly those in their earliest years as medical trainees — may not have been taught to evaluate if what’s been conveyed to them is valid or applicable in their patient population. This will be a recipe for confusion, or genuine shoring up of poor clinical reasoning. Teachers stressed the importance of training students to cross-check AI outputs against reputable sources. “It’s particularly concerning when students carry the statements that ChatGPT makes with certainty even though it provides reasonable but not accurate information,” one faculty member said.

Furthermore, the linguistic and cognitive complexity of ChatGPT’s explanations was identified as a barrier to use for F1 students who did not have sufficient vocabulary or conceptual foundation needed to comprehend advanced medical terms. A lot of information is often in the AI content, enough to be too technical and difficult for beginners to understand without explanation, many educators found. As another participant commented, “Some students don’t understand the AI-generated explanations because they are written in very technical language that would be difficult to grasp without having prior experience using it”.

Other things are also bonded with the flaw and cause the actual use of ChatGPT. Most students in private universities have smartphones or computers, but disparities across the board — from internet reliability to digital literacy — leave people with uneven learning opportunities. Both power outages and low-bandwidth connections, as well as limited access to the kind of AI tools that Ingram provides, prevent some students from getting everything they can out of these materials. “It’s also knowing how to use these tools, on a consistent basis and to great effect,” said one educator in an online comment. “And not all students are there yet.”

One final but critical limitation is that we do not have localized medical information on ChatGPT. They also observed that while the tool is filled with so much general medical information, it’s trained on datasets that pretty much reflect Western clinical contexts, guidelines and disease patterns.

Consequently, students might learn examples that are not relevant or applicable to Pakistan’s healthcare realities. Teachers stressed that AI tools should learn from regional case studies and endemic disease patterns. It seemed to do well on general medical knowledge,” one participant wrote, “however, there are no examples related to the healthcare landscape of Pakistan, such as case studies on respiratory diseases due to smog.” This gap not only restricts contextual relevance, but it can also unwittingly distance students from the practical contexts they'll be called on to respond to.

Taking together, these concerns provide a strong rationale for careful and intentional incorporation of ChatGPT into medical education curricula. Without sufficient checks, ethical parameters and tailoring to local context, the potential value of the tool is at risk of being overshadowed by unintended pedagogical and professional effects.

Needs for Training

Majority of the participants expressed their desire of urgency for comprehensive faculty training how to incorporate ChatGPT in an ethical, effective, and pedagogically sound manner into the medical curricula. However, with this acknowledgement that without any second opinion Chat GPT no doubt is the most effective tool to support language learing, teachers expressed that this potential of ChatGPT as an effective tool could turn into reality when teachers are well equipped, skilled and informed to integrate ChatGPT in practical and effective way into the curriculum. This is not possible without structured training, as stated by one respondent in the interview, “AI tools in the classroom could unintentionally perpetuate misinformation and promote academic shortcuts or misuse of the technology.”

All respondents laid great emphasis on dedicated professional development which offers and emphasizes experiential learning and theoretical understanding of AI appropriation for learning purposes. They also added that these programs would technical skills as well as the ethical implications of using generative artificial intelligence, its potential to undermine academic integrity, and how to design courses in which AI is integrated effectively. Teachers also proposed that assistance should be provided on how to design AI-assisted lectures, critically assess AI-created content, and guide student conversations about the limits of ChatGPT. As stated by respondent C, “It’s not sufficient enough to know and acknowledge AI’s existence but we as well as our students should be taught how to use it responsibly and ethically.”

Another important aspect that was shared by the teachers was that technology is evolving much faster than institutions are ready to adjust. It is important to note that students have quickly embraced new tools, when it comes to classroom technology whereas mnay teachers feel that they are left behind as they do not have any formal support or policy direction shared by their institutions. Respondent F put forward his

opinion, “There’s a disconnect seen. I have seen students are already using ChatGPT whereas many of my colleagues don’t even know where to start. We need to fill this gap. It is only possible when we have proper roadmap and training how to actually practice it.” Such implications have synergetic ramifications for risk of casual or unchecked implementation of AI in the classroom leading to an erosion of educational soundness and student responsibility.

Moreover, participants stressed that faculty AI literacy should go beyond technological comfort. It should also surface those approaches which develop student critical thinking, incorporate evidence-based learning and maintain the educator as central to the educational experience. Some teachers fretted that instructors without proper guidance would either overuse ChatGPT or shun it altogether, missing out on chances to scaffold learning in fresh ways. “One teacher cautioned, “‘Without the faculty having been properly trained it is at risk of being misused and potentially contributing toward academic dishonesty or misleading/inaccurate medical knowledge.’

Participants suggested that institutions offer AI development modules in faculty development programs; make workshops during faculty orientations mandatory, and establish collaborations among departments of faculty, instructional design and IT. These would be first steps toward establishing institutional capacities that will prevent ChatGPT from being used as a substitute for academic skills and knowledge and develop it in such a way that it can contribute to student learning while fostering the high quality of education. Laying the groundwork for educators to be prepared to use AI in ways that align with the ethical, contextualized, and effective approach needed to shape future healthcare professionals through working collaboratively with AI and effectively using AI resources.

A few meaningful recommendations were made by medical educators to optimize ChatGPT in the undergraduate medical education context, especially in the Pakistan private university system. The most frequent suggestion was to incorporate localized medical resources to ensure that the tool resonates with students’ local clinical, cultural and epidemiological contexts. ChatGPT provides descriptive medical explanations, participants observed, but its examples more often showcase models of healthcare found in the western world, which compete with each other and least reflect the hurdles and limits of Pakistan’s medical practice. They also argued that the model’s response framework should include region-specific case studies, including those concerning dengue fever outbreaks, environmental health issues related to smog, or hurdles with rural maternal care. As one educator told us, “Figuring out how to treat respiratory illnesses driven by smog is way more relevant to our students than interpreting a case about Lyme disease or frostbite.”

Beyond content localization, multiple participants suggested adding voice-based procedural support into ChatGPT’s functionality. They imagined the tool serving on as an audio guide walking students through clinical procedures, step by step, helping them master practical techniques such as venipuncture, catheter insertion, or dressing a wound. This capability, they argued, would especially benefit students who learn best through auditory cues and bolster skills taught during in-person clinical rotations. “Audio instructions for common procedures would be a game-changer — students could practice with guidance outside of the lab, even,” one teacher said.

Another focus was on accessibility, which was improved. Teachers said that while many students in urban areas are familiar with other online learning platforms, others, especially those in semi-urban or remote areas, face frequent connectivity issues. To bridge this digital divide, the participants recommended building ChatGPT in light-weight format and enabling it to work in a low-bandwidth and/or non-continuous-link environments. Such models could ensure broader access, increased accountability and more equity in what students’ study. “If ChatGPT incorporated location-specific medical knowledge and worked consistently in areas with poor internet access, it could be a better educational tool,” wrote one of the respondents.

ChatGPT should also be customizable on an institutional level, they suggested — letting medical colleges to embed their own curriculum objectives, terminologies and case repositories. This would bring the instrument into better alignment with national medical level descriptors and enhance its cross-reference to formal academic curricula. "We can all agree ChatGPT should not replace pedagogical and faculty development training that people get in medical schools all over world, but it's a tool," a teacher said. “As AI tools become widely available, this work serves as early guideposts for how to responsibly develop good curricular content.

Discussion

The findings of the present research revealed that ChatGPT in medical education in private universities has been integrated and has a lot of potential in delivering the content in a better and effective manner. It has been found that ChatGPT is an effective resource that can be utilized according to an individual’s learning style, helps in generating immediate feedback, and helps students in improving their

understanding of complex concepts (Aruleba et al., 2023). Moreover, the findings from the teachers' perceptions and experiences also illustrated the important caveats related to the tool's limitations, its ethical implications, and the need for thoughtful implementation. This study also brings attention to that ChatGPT can be used for self-directed learning and to understand clinical reasoning resources, but at the same time it also highlights the unsafe practice of over-reliance on AI by students at the cost of critically appraising information which leads to blind agreement with information without any thinking (Gill et al., 2023). The results also depicted that it is important to teach students to develop their own reasoning and judgement and critically think about information. ChatGPT tends to be a good source of instant information, provides language support, personalized elaboration and an excellent tool for better revision of concepts (Ravšelj et al., 2025).

The findings also revealed that for the success of any program and its curriculum it is crucial to provide opportunities for formal professional development programs for the faculty (Tan & Subramonyam, 2024). Professional training programs are considered as vital factor to train teachers how to use AI effectively in their classes. They also get trained to tackle ethical issues that arise and ChatGPT, for example, should supplement teaching learning process instead of replacing it. The findings also revealed that both teachers and students should be equipped with digital literacy skills so that it makes sense of the new world of AI-based learning tool and they fully draw benefit from it. This study also highlights the importance of establishing guidelines and policies for effective and responsible use of ChatGPT in academic contexts. This also entails being open about AI driven content and plagiarism related issues with plagiarism (Jeyaraman et al., 2023). Concerns regarding ethical issues regarding ChatGPT raise concerns about data privacy, data protection, algorithmic bias, the risk of cyberbullying, and intellectual property infringement. The considerations regarding these ethical aspects are essential to maintain the integrity of academic processes. it is very important that more and as well as long term assessments should be conducted in order to improve the usage of ChatGPT in Pakistan's education system. The results also highlight the importance of keeping in view of the local context, the issues of connectivity and integration of local data. These measures will help in the effective and relevant use of tools which is well suited to the educational context and requirement.

As result, by adapting tool according to Pakistani medical education would increase its advantages and reduce its disadvantages. These findings are aligned with Mortia et. Al. (2023) that Healthcare contexts include not only technological factors but also consists of regulatory mechanisms which may potentially affect the applications of AI; this includes privacy laws, data protection rights as well as ethical guidelines for AI use in healthcare. Therefore, institutions will need to produce and communicate policies regarding the degree to which complete data sets are available for analysis extent to which complete datasets are available for analysis and explain how they would determine benefit and drawback of the system (Sušnjak et al., 2022).

While using ChatGPT, it is essential that feedback is collected regularly from both students as well as teachers. It will be helpful in improving and modifying the tool according to the growing need and demand of the teachers and students so that it becomes more effective, beneficial and relevant. It is important that teachers are aware of the limitations, including the reliability of the information it provides and ethical concerns such as plagiarism and its potential negative impact on students' critical thinking (Ali et al., 2024). It is also important that students are trained to use these tools responsibly. However, this would only be possible when AI literacy and ethics were made part of the education system. However, there are also risks such as data poisoning and manipulation, which require further research to understand how they occur and how they affect the system (Ke et al., 2025).

Conclusion

The aim of the present research was to gain deep insight and information regarding attitude and experience of medical college teachers about the use of ChatGpt in teaching ang learning process. It is concluded that there are lots of challenges and complexities that are associated with Ai use in academia. Use of Ai is not just an opportunity but is also less than avoidable challenge, that educators have to face to take advantage of this compelling technology. The present study has explored the potential usage of ChatGPT in private medical institutes in Pakistan and has discusses the related challenges in medical curricula and suggested ways to use it effectively. The results would add to the growing research on AI in education. It also offers practical guidance for teachers and institutions who are interested in integrating ChatGPT and similar tools into their courses. In a nutshell, the aim is to enhance student learning, promote equality and fairness in education, and prepare students for the future as there is a growing demand of AI in everyday life.

Nevertheless, the current study has a number of limitations that must be considered when interpreting the results; as it only considers biochemistry teachers' point of view of private universities, which may narrow the generalization to some other educational context and public institutions or different

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fields. However, the sample size, while sufficient to meet the study objectives, may not represent all experiences and perceptions in the general population of medical education. In addition, the cross-sectional design of the study only offers a mere snapshot of teachers' perceptions at one particular point in time and therefore overlooks the temporal change that may occur regarding their experiences with ChatGPT over time. There might be more to see once there are longitudinal studies — over the years of working with AI tools, as teachers become more experienced.

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