Integration of ChatGPT in IMG Study Strategies: An Exploratory Study of User Experiences and Perceptions

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Abstract

Introduction: IMGs face extensive challenges when preparing to enter a foreign workforce, such as adapting to new learning systems and studying without guidance, which can be alleviated by using AI tools like ChatGPT to supplement their studies by explaining concepts, generating questions, and providing personalized feedback.

Objective: To explore IMGs' experiences with integrating ChatGPT into their study strategies.

Methodology: This prospective concurrent mixed-methods study, conducted over six months, employed a sequential explanatory design. It began with qualitative semi-structured interviews and focus groups, followed by quantitative surveys administered via Google Forms to collect data on usage patterns, satisfaction levels, and demographics. A sample size of 305 IMGs, determined iteratively, ensured a robust dataset reflecting diverse experiences.

Results: A total of 305 participants, with a mean age of 26.7 years (SD: 3.2), were included in the study. The sample was predominantly male (69%) and primarily composed of graduates (43.28%). Most participants resided in urban areas (82%). Nearly half (49.5%) were actively engaged in USMLE preparation, focusing on Step 1 (39.7%) and Step 2 CK (31.5%). ChatGPT was mainly used for concept clarification and practice questions. The satisfaction rating averaged 3.7 (SD: 1.2), and 7.2 out of 10 participants were willing to recommend it. Awareness of ChatGPT came primarily from social media (31.15%) and online searches (28.52%).

Conclusion: Participants reported that ChatGPT was beneficial for concept clarification and practice questions, though concerns about accuracy and potential plagiarism were noted. The study concludes that while ChatGPT holds significant promise as a supplementary study tool, users should verify information for accuracy and combine its use with traditional study methods to enhance comprehensive understanding. Incorporating ChatGPT into medical curricula as a supplementary tool, with proper training on responsible use, could further maximize its benefits.

Keywords: Artificial Intelligence (AI), ChatGPT, International Medical Graduates, IMG, USMLE, medical students, study strategies, mixed-methods study

Introduction

IMGs are International Medical Graduates. This means "a physician who has received their medical degree from a school outside of the United States or Canada" [1]. IMGs go through extensive struggles while preparing to enter the workforce away from their home. Such struggles include having to adapt to a completely new system of learning, understanding concepts and question styles they have never been taught before and, in most cases, studying without anyone to guide them.

Artificial intelligence is a relatively new piece of technology that has been fantasized about for decades in movies and stories which is finally becoming reality.

Artificial Intelligence by definition is "the ability of a computer system to mimic the behavior of the human brain" [2] which allows the technology to, in a way, think on its own. While the uses of Artificial Intelligence are countless, this study will focus on the use of Artificial Intelligence in the journey of IMGs.

Over time, the development of Artificial Intelligence has made access to the technology much more widely available. A version of this is ChatGPT. ChatGPT has allowed education to excel due to multiple reasons. Students and professors alike use ChatGPT to supplement education and learning [3]. Its use has allowed better understanding and creative delivery of information to students.

ChatGPT can now be used by IMGs to supplement their studies by explaining difficult concepts, fact-checking, explaining answers to questions, producing questions and flashcards as well as checking the user's understanding of a topic [3]. It can also be used for research into how to study for an exam as well as producing study schedules and plans for IMGs to follow.

While the use of ChatGPT is highly beneficial in educational settings if used correctly, the misuse of it is also prevalent [4]. The use of ChatGPT has allowed plagiarism of entire assignments, cheating in exams and furthered the divide between students and educators. This disconnect could worsen situations for IMGs where bias and mistrust become the norm.

As the technology develops, its use is also refined. Due to Artificial Intelligence being relatively new, there is not much research around it. This study aims to explore the user experiences and perceptions around ChatGPT.

Literature Review

The integration of technology into medical education has evolved over the years. Technology has gained widespread adoption in medicine training, influencing teaching methodologies at all levels of medical education [5]. Medical students play a pivotal role in sculpting the development and use of technology in the realm of education. Moreover, medical students can provide creative ideas that go beyond traditional approaches, contributing to innovative advancements in technology integration efforts [6]. The use of a constructivist learning environment, supported by technology, has shown significant effectiveness in enabling students to access information. Furthermore, it assists them in analyzing, interpreting, and organizing the acquired information, ultimately enhancing the development of their knowledge base [7]. Aligned with the constructivist approach, the integration of technologies into the process of learning empowers students to take control of their knowledge and competence. This allows them to pinpoint exactly what is required to fill the gaps in their understanding [8]. Hence, it becomes evident that ChatGPT, an AI powered tool, has the capacity to foster constructivist approach to education for students. This is accomplished by giving them the capability to investigate and brainstorm with ideas, ask questions, and receive timely feedback.

Multiple studies have been conducted in recent years to learn about the use of artificial intelligence powered tools in exam preparation. OpenAI, a company founded in the United States in 2015, is the creator of ChatGPT. Its version 3.5 was released for free to the public in November 2022. ChatGPT holds the capacity to boost engagement and elevate the learning process for students [9]. ChatGPT can significantly benefit higher education by aiding in writing projects such as content generation, summarizing information and outlining. It can be instrumental in conserving time and improving the outcomes. Moreover, the tool has the capability to identify grammatical errors, thereby enhancing the overall clarity of written material [10,11] stated that ChatGPT is beneficial in the realm of medical education and clinical decision-making. This is evidenced by its ability to provide precise responses in all three steps of USMLE. ChatGPT offers immediate and personalized medical information, making it a valuable tool for medical education. Its capability to swiftly gather information on diverse medical topics can aid students in obtaining real-time assistance and learning [12]. ChatGPT has the power to evolve into a more reliable and valuable resource for understanding anatomy. This improvement stems from its ability to enhance understanding of the concepts of anatomy and create suitable questions across varying difficulty levels [13]. Universities are encouraged to embrace a proactive stance, opting for the adoption of AI technology in the fields of education, learning, and assessment, rather than a reactive approach [14].

Given its recent introduction, there is a noticeable dearth of peer-reviewed research investigating the multifaceted use of ChatGPT within educational contexts. As of the writing of this paper, the technology is in the initial stages of exploration. Following the release of its free version to the public, a proliferation of studies has emerged, delving into the advantages of AI-powered tools and their potential to either complement or revolutionize medical education and practice. Despite this increasing interest in the broader applications of ChatGPT in medicine, a conspicuous gap in existing research is the absence of inquiries into the attitudes, knowledge, and usage patterns specifically related to ChatGPT in the preparation for the United States Medical Licensing Examination (USMLE) among IMGs. This distinctive aspect warrants attention, as understanding how IMGs engage with ChatGPT in the context of USMLE exam preparation is essential for gaining insights into the tool's utility and effectiveness within this specific educational domain. Therefore, the objective of this paper is to bridge the existing research gap.

Objectives
To explore IMGs' experiences with integrating ChatGPT into their study strategies

Materials and Methods
Study Design
Conducted over six months, this prospective concurrent mixed-methods study employed a sequential explanatory design to explore the experiences of International Medical Graduates (IMGs) integrating ChatGPT into

their study strategies for licensing exams preparation. The study comprised a qualitative phase involving semi-structured interviews and focus groups, facilitating an in-depth exploration of participants' experiences. Utilizing a purposive sampling strategy, diversity was ensured across variables such as exam type, duration of ChatGPT usage, and perceived effectiveness. Following the qualitative phase, a supplemental quantitative phase featured surveys administered via Google Form to collect data on usage patterns, satisfaction levels, and demographics. The sample size of 305 participants was determined iteratively, emphasizing thematic saturation and ensuring a robust dataset reflective of the varied experiences of IMGs in their exam preparation journey.

Participants

The study recruited 305 IMGs actively preparing for licensing exams and using ChatGPT as a study aid. The inclusion criteria encompassed a range of exam types and usage durations to capture a comprehensive understanding.

Data Collection

Data collection for this study employed a meticulous approach to ensure comprehensive insights. In the qualitative phase, semi-structured interviews and focus groups were conducted, allowing participants to provide detailed accounts of their experiences with ChatGPT. A purposive sampling strategy was implemented, ensuring diversity in participant backgrounds, exam types, duration of ChatGPT usage, and perceived effectiveness. Thematic saturation was continuously assessed, guiding the iterative sampling process until no new themes emerged, thereby ensuring a rich and varied dataset.

In the quantitative phase, a supplemental survey, administered via Google Form, gathered quantitative data on participants' usage patterns, satisfaction levels, and demographics. The survey included questions related to USMLE preparation details, effectiveness of ChatGPT, and thoughts of IMGs, presenting findings in Tables 1 to 4.

Reliability and Validity

Prior to public distribution, the questionnaire underwent rigorous pilot testing with 25 participants, allowing for necessary corrections and refinements based on participant feedback, enhancing the instrument's reliability and validity.

Sample Size Calculation

The iterative determination of the sample size was based on achieving thematic saturation, ensuring that the qualitative dataset captured the diversity and depth of IMG experiences.

Statistical Analysis

Quantitative data were analyzed using SPSS version 27 for descriptive statistics and inferential analysis. Demographic characteristics, USMLE preparation details, effectiveness of ChatGPT in USMLE preparation, and thoughts of IMGs were presented using mean, frequency, and percentage values, enhancing the study's comprehensiveness.

Ethical Statement

This study on integrating ChatGPT into the study strategies of IMGs prioritized ethical principles such as participant confidentiality, informed consent, and transparent data handling. Participants were fully informed of the study's purpose and potential implications of AI tool usage in medical education. Rigorous measures were taken to ensure data anonymity and integrity throughout the research process.

Results

A total of 305 participants responded to our questionnaire and were included in the study. Table 1 provides a detailed breakdown of the demographic profile of participants enrolled in a particular study. The mean age of the cohort is reported as 26.7 years, with a standard deviation of 3.2 years, suggesting a relatively homogeneous distribution within the age range. Gender distribution indicates that among the 305 participants, 69% are male (209 individuals) and 31% are female (96 individuals), indicating a male predominance within the sample. Education levels are categorized into four groups: those currently enrolled in MBBS (33.44% of participants), graduates (43.28%), individuals undergoing training (12.82%), and those enrolled in residency programs (10.49%). This breakdown provides valuable insight into the educational background of the study participants. Additionally, the residential distribution reveals that 82% of participants reside in urban areas (250 individuals), while 18% are from rural locales (55 individuals), reflecting an urban-centric composition within the sample.

Table 1: Demographic Data

Variables		n	%
Age in years	Mean ± SD	26.7 ± 3.2	-
Gender	Male	209	69%
Frequency (%)	Female	96	31%
Level of Education	Enrolled in MBBS	102	33.44%
	Graduated	132	43.28%
	Training	39	12.82%
	Residency Programs	32	10.49%
Residence	Rural	55	18%
	Urban	250	82%

n: Number of Participants, %: Percentage

Table 2 presents a comprehensive breakdown of USMLE (United States Medical Licensing Examination) preparation details among the surveyed participants, offering valuable insights into their preparation strategies, durations, steps undertaken, planned exams, and motivations. The data reveals that nearly half of the

participants (49.5%) are actively engaged in USMLE preparation, with an average preparedness score of 4.2 (±1.1), while the remaining respondents (50.5%) are not currently preparing, scoring an average of 3.8 (±0.9). Participants have primarily focused on Step 1 (39.7%), Step 2 CK (31.5%), or have not yet started any step (29.2%), with respective average preparedness scores of 4.5 (±0.8), 4.1 (±1.0), and 3.6 (±1.2). Regarding preparation duration, significant proportions of participants have spent 3-6 months (36.4%) or more than 6 months (33.1%), achieving average readiness scores of 4.3 (±0.7) and 4.0 (±1.2), respectively. Notably, the majority of participants plan to undertake Step 2 CK

(52.8%) or Step 3 (31.5%), aiming for average preparedness scores of 4.2 (±1.0) and 4.0 (±0.8), respectively. Furthermore, motivations for opting for the USMLE vary, with career advancement (39.7%) and residency requirements (36.4%) being primary factors cited, alongside a notable percentage (24.6%) marking N/A, reflecting diverse reasons within the cohort. This scientific analysis offers valuable insights into the diverse USMLE preparation strategies, durations, steps, planned exams, and underlying motivations among the surveyed participants, crucial for understanding the dynamics of medical licensing examination readiness.

Table 2: USMLE Preparation Details

Variables		Mean (±SD)	Frequency (n)	Percentage (%)
Studying for USMLE	Yes	4.2 (±1.1)	151	49.5
	No	3.8 (±0.9)	154	50.5
Steps Taken	Step 1	4.5 (±0.8)	121	39.7
	None	3.6 (±1.2)	89	29.2
	Step 2 CK	4.1 (±1.0)	96	31.5
Preparation Duration	3-6 months	4.3 (±0.7)	111	36.4
	1-3 months	3.9 (±0.9)	96	31.5
	More than 6 months	4.0 (±1.2)	101	33.1
Planned Step	Step 2 CK	4.2 (±1.0)	161	52.8
	Step 3	4.0 (±0.8)	96	31.5
Reason for Opting	Career Advancement	4.1 (±1.1)	121	39.7
	Residency Requirement	4.3 (±0.9)	111	36.4
	N/A	3.8 (±1.0)	75	24.6

Figure 1 offers a comprehensive analysis of the sources contributing to individuals' awareness of ChatGPT, delineating both the frequency and percentage distribution. Notably, social media emerges as the predominant source, with 95 instances reported, constituting 31.15% of the total awareness. Following closely, online search platforms contribute significantly, with 87 instances (28.52%), underscoring the relevance of digital information dissemination channels. Word of mouth stands out as another influential source, with 57 instances (18.69%), suggesting the impactful role of personal recommendations in promoting awareness. Blogs also serve as contributors, accounting for 27 instances (8.85%), in the dissemination of information regarding ChatGPT. Additionally, friends play a significant role in raising awareness, with 29 instances (9.51%), while news outlets contribute a minor yet noteworthy proportion, with 10 instances (3.28%). This comprehensive breakdown elucidates the diverse pathways through which individuals gain knowledge about ChatGPT, shedding light on the multifaceted dynamics of information dissemination and awareness-building within digital and interpersonal communication ecosystems.
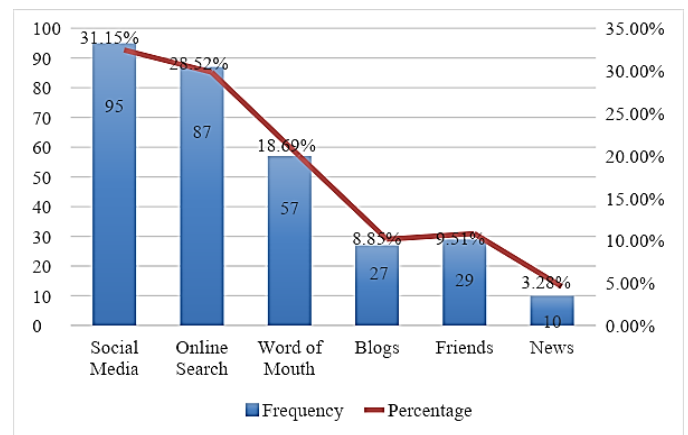

Figure 1: Source of Awareness about ChatGPT

Figure 2 presents a breakdown of the purposes for which users employ ChatGPT, expressed in both frequency and percentage terms. Predominantly, users utilize ChatGPT for concept clarification and engagement in practice question and answer sessions, constituting 31.15% of reported instances. Additionally, a significant proportion, accounting for 28.52%, employs ChatGPT for exam preparation and content clarification. A notable yet smaller portion, representing 18.69% of instances, involves the summarization of study materials. For research purposes and accessing additional resources, 8.85% of instances utilize ChatGPT. Collaboration within study groups accounts for 9.51% of reported instances, while a minor yet noteworthy portion, representing 3.28%, employs ChatGPT for general awareness. This comprehensive breakdown underscores the multifaceted utility of ChatGPT, elucidating its role in aiding various

aspects of learning, preparation, collaboration, and knowledge acquisition among users within educational and research contexts.
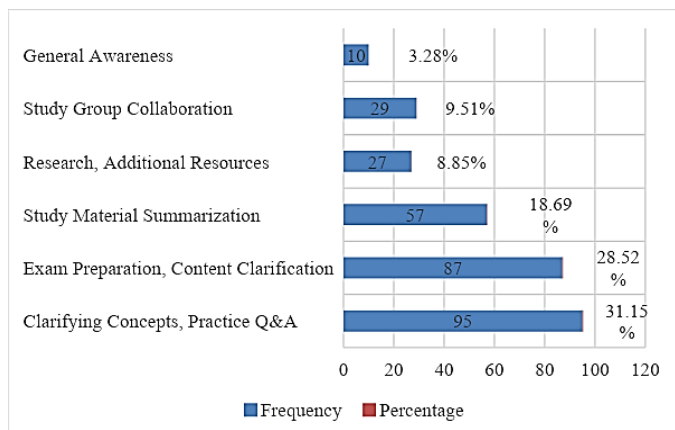

Figure 2: Purpose of using ChatGPT

Figure 3 offers a detailed analysis of the frequency of ChatGPT usage in hours among participants, providing both participant counts and percentage distribution. Notably, the most common usage duration reported is 1 hour, with 33% of participants, totaling 102 individuals, falling into this category. Following closely, 26% of participants reported usage of less than 0.5 hours, comprising 78 individuals. Additionally, 17% of participants utilized ChatGPT for 1.5 hours, represented by 53 individuals. Furthermore, 13% of participants reported usage of 0.5 hours, while 9% and 2% utilized ChatGPT for 2 hours and 3 hours, respectively, with 27 and 6 participants in each category. Interestingly, no participants reported usage of 4 hours. This comprehensive breakdown offers valuable insights into the distribution of ChatGPT usage durations among participants, facilitating a nuanced understanding of usage patterns within the sample population.
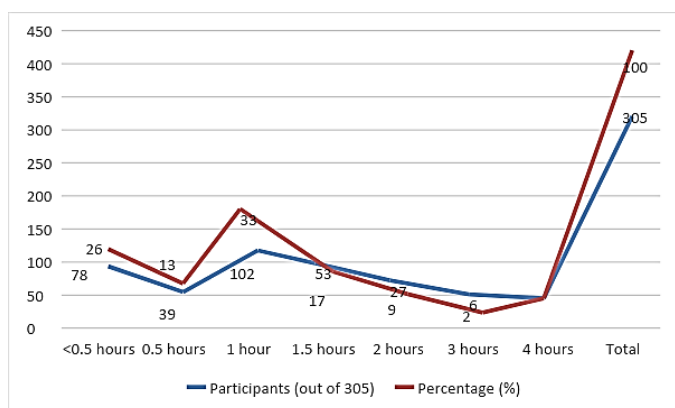

Figure 3: Frequency of Use in Hours

Table 3 provides an empirical analysis of ChatGPT's effectiveness in supporting preparation, satisfaction ratings, and participants' inclination to recommend the tool. Respondents' perceptions on ChatGPT's utility across various preparation facets were examined. In the preparation assistance section, responses revealed a division, with 150 participants affirming ChatGPT's helpfulness and 155 expressing dissent. Similarly, regarding answer adequacy, 205 participants acknowledged satisfactory responses, while 100 disagreed. Evaluation of ChatGPT's comparative utility against alternative resources showed that 130 participants found it more helpful than other sources, while 175 did not share this view. Similarly, in contrast to traditional resources, 75 participants favored ChatGPT, whereas 230 did not. Additionally, satisfaction ratings averaged at 3.7, with a standard deviation of 1.2, indicating moderate satisfaction. Participants' willingness to recommend ChatGPT yielded an average rating of 7.2, with a standard deviation of 4.3, showcasing a generally positive inclination towards endorsement. This data provides insights into participants' perspectives on ChatGPT's educational efficacy and its standing among preparatory resources, offering valuable implications for its role in educational contexts and potential impact on learning outcomes.

Table 3: Effectiveness of ChatGPT

Statements	Yes	No
Helpful for Preparation	150	155
ChatGPT Provide Satisfactory Answers	205	100
More Helpful Than Other Resources (websites, research articles, videos etc)	130	175
More Helpful Than Books/Courses	75	230
Satisfaction Rating (1-5, Mean±SD)	3.7±1.2	
Willing to Recommend (1-10, Mean±SD)	7.2±4.3	

Table 4 presents insights from International Medical Graduates (IMGs) regarding the integration of ChatGPT into their study strategies for USMLE (United States Medical Licensing Examination) exam preparation. Participants provided diverse perspectives on ChatGPT's utility and areas for improvement. Several comments highlighted its usefulness for daily tasks, study support, brainstorming, and generating practice questions, albeit with suggestions for improvement in summarizing complex topics and refining responses for accuracy. Some participants recommended ChatGPT for specific tasks like generating outlines and clarifying concepts but expressed concerns about potential plagiarism and the tool's reliability for factual information. Others noted benefits such as enhancing writing skills, breaking down complex concepts, staying updated on research, and enjoying interactive Q&A sessions. However, some participants did not observe noticeable improvements in their USMLE performance despite using ChatGPT. Overall, the comments reflect a range of experiences and perceptions regarding ChatGPT's integration into study strategies, emphasizing its potential benefits alongside areas for enhancement to better align with the diverse needs of IMGs preparing for USMLE exams.

Table 4: Thoughts of IMGs in integrating ChatGPT into their study strategies for USMLE exams preparation.

S.No.	Comments
1.	Useful for daily tasks; Good overall
2.	Limited functionality; Needs improvement, especially in summarizing complex topics.
3.	Excellent support for study sessions, especially for generating practice questions and consolidating knowledge.
4.	Helpful for brainstorming; User-friendly interface makes it easy to explore different perspectives.
5.	Useful for specific tasks; Recommended for generating outlines and summarizing key points.
6.	Great tool for quick references; Recommend for clarifying concepts and finding additional resources.
7.	Can be time-consuming to refine responses to desired accuracy.
8.	Concerns about potential plagiarism if not used responsibly.
9.	Valuable tool for self-directed learning, but should not replace traditional study methods.
10	Unreliable for factual information; requires careful cross-checking.
11	Improved my writing skills through exposure to different writing styles.
12	Concerns about potential bias in responses, especially on sensitive topics.
13	Helpful for breaking down complex concepts into simpler terms.
14	Valuable tool for staying up-to-date on current research in the field.
15	Needs better integration with existing study materials and platforms.
16	Can be a helpful starting point for research, but further exploration is necessary.
17	Enjoyed the interactive nature of using ChatGPT for Q&A sessions.
18	Found the explanations generated by ChatGPT to be clear and concise.
19	No noticeable improvement in my USMLE performance after using ChatGPT.

Discussion

ChatGPT emerged as an important study tool for a varied variety of students, including IMGs preparing for exams such as the USMLE. The application of ChatGPT in medical education highlights its potential to challenge traditional study methods and improve learning results.

The demographics of the study participants, characterized by a mean age of 26.7 years, predominantly male representation (69%), and a mix of graduate students (43.28%), MBBS students (33.44%), trainees (12.82%), and residents (10.49%), reflect a cohort that mirrors the diverse demographic landscape of IMGs undertaking USMLE preparation. Furthermore, the urban-rural distribution highlights the accessibility and appeal of ChatGPT across different geographical settings.

A significant proportion of participants (49.5%) were actively engaged in USMLE preparation, with a focus primarily on Step 1(39.7%) and Step 2 CK (31.5%). Literature states that all USMLE aspirants spent a minimum of 1-2 months dedicated preparation period before appearing for the exam. [15] The present study results demonstrate that participants spent at least 3-6 months (36.4%) or more than 6 months (33.1%) in their exam preparation. The motivations for undertaking the USMLE, including career advancement (39.7%) and residency requirements (36.4%), align with existing literature [15, 16], emphasizing the pivotal role of standardized exams in shaping medical career trajectories.

The channels through which participants became aware of ChatGPT, primarily social media (31.15%), online search platforms (28.52%), and blogs (8.85%), underscore the platform's digital prominence and widespread accessibility. This trend is also reflected in other studies, which indicate that media, family and friends, and online forums serve as primary sources of knowledge for students to explore the use of AI tools for educational purposes [17].

In medical education, ChatGPT serves various purposes. Our findings illustrate that participants predominantly utilize ChatGPT for concept clarification and engagement (. 28.52%) in practice question and answer sessions (31.15%), reflecting its versatility as a study aid catering to diverse learning needs. 18.69% use for summarization of study materials, 8.85% use for research purposes and accessing additional resources, 9.51% use for collaboration within study groups, 3.28% use for general awareness. Comparable patterns in ChatGPT usage have been noted across several studies, emphasizing its significance as a valuable tool for academic support [18, 19, 20].

The varying durations of ChatGPT usage reported by participants highlight the platform's adaptability to individual study habits and schedules. The predominance of shorter usage durations (33% of participants using it for 1 hour and 26% of participants using it for less than 30 minutes) suggests that ChatGPT serves as a supplemental rather than primary study resource for most participants.

In the current study, almost 50% of participants acknowledged ChatGPT's usefulness in exam preparation. However, many did not view it as superior to other tools or conventional study techniques, as overreliance on ChatGPT may compromise the critical thinking ability of a student [21]. Nevertheless, our results displayed ChatGPT's perceived utility as an additional study tool among IMGs, as shown by its moderate satisfaction ratings (17.7) and positive attitude towards recommendation. Participants' willingness to recommend ChatGPT yielded an average rating of 7.2, showcasing a generally positive inclination towards endorsement.

The feedback received from participants highlights ChatGPT's usefulness for a range of study-related activities and offers recommendations for improving its ability to accurately summarize intricate subjects and guarantee responses. Concerns about factual information's reliability and plagiarism indicate areas that need to be improved to boost user confidence and reduce misuse, reiterating similar concerns identified in prior researches [21, 22, 23].

The results of this study will have a significant effect on how IMGs study for the USMLE. ChatGPT's efficacy might be increased if it were incorporated into official test preparation materials in partnership with medical schools and licensing organizations [19]. To ensure appropriate use of ChatGPT in medical education, it is imperative to examine its limits, including risks related to plagiarism and factual accuracy. Support and training for users can maximize advantages even further while reducing misuse. In conclusion, it is essential to maintain ongoing enhancements grounded in user input and research to guarantee ChatGPT's continued relevance in the dynamic field of medical education.

While this study offers valuable insights, limitations like the lack of a control group and potential biases in self-reported data require cautious interpretation. Additionally, the cross-sectional nature of the study provides only a snapshot view and does not capture long-term trends or changes in attitudes or usage habits over time with ChatGPT. The relatively small sample size further restricts the depth and range of analyses. Future research should address these by recruiting a more diverse participant pool (including those unfamiliar with ChatGPT) and incorporating a control group for comparison. Longitudinal studies could assess the long-term impact of ChatGPT use on IMG careers. Additionally, a mixed-methods approach combining quantitative data with interviews or focus groups could provide a deeper understanding of how IMGs experience and utilize ChatGPT. Despite these limitations, this pioneering study highlights the potential of ChatGPT in IMG exam preparation and underscores the need for further exploration to optimize its role in medical education.

Conclusion

Our study, comprising of 305 international medical graduates (IMGs) delves deep into the integration of ChatGpt into medical education where the prime focus is the impact on USMLE preparation strategies. Our findings revealed that while some participants expressed reservations with regards to the accuracy of the software and the potential plagiarism risk it was still used by many participants for concept clarification and to solve practice questions thereby showing an inclination towards its potential as a supplementary resource.

While IMGs can utilize ChatGpt strategically, they should consider cross checking the responses for accuracy and provide feedback as constructive criticism so as to facilitate the softwares performance.While ChatGpt is a valuable resource, it is recommended to diversify study methods keeping in touch with the traditional study techniques in order to ensure a better comprehensive understanding. Educators should add ChatGpt as a supplimentary tool to the medical curriculum and train students to effectively utilize it while keeping in view the academic integrity and responsible use of AI to mitigate potential plagiarism risk.

Authors Contributions
All authors contributed equally in conducting this study.

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