

Integrating ChatGPT Into Clinical Laboratory Science Education: A Survey and Pilot Study

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ABSTRACT

Artificial intelligence (AI) holds significant potential to transform higher education, including health professions education. ChatGPT, a large language model, is reshaping teaching and learning within this field. This study explores the impact of ChatGPT on clinical laboratory science (CLS) education by examining the knowledge, perspectives, and experiences of learners from the CLS and Doctorate in Clinical Laboratory Science (DCLS) programs. A cross-sectional survey assessed learners' knowledge, attitudes, and use of ChatGPT, and a ChatGPT/AI-assisted learning module was integrated into the CLS/DCLS curricula to evaluate its practical application. The results revealed that CLS learners were significantly more familiar with and used ChatGPT more frequently in their coursework compared with DCLS learners. However, DCLS learners expressed greater optimism about integrating ChatGPT/AI into both professional education and clinical practice. Key concerns raised by both groups included academic integrity and the accuracy of ChatGPT's outputs. Although learners recognized ChatGPT's potential to assist with research, scientific writing, and learning support, they also emphasized the importance of human oversight to mitigate biases stemming from limited training data. Despite these concerns, over half of the respondents expressed a positive outlook on ChatGPT/AI, anticipating its valuable role in future clinical laboratory practice. This study highlights the need for careful AI integration to address risks while maximizing educational benefits. Establishing clear guidelines and policies is essential for educators to leverage ChatGPT/AI effectively, ensuring ethical use and maintaining academic integrity in health professions education.

ABBREVIATIONS: AI - artificial intelligence, CLS - clinical laboratory science, DCLS - Doctorate in Clinical Laboratory Science, KUMC - University of Kansas Medical Center, MLS - medical laboratory scientist.

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INTRODUCTION

ChatGPT, a powerful language model developed by OpenAI (San Francisco, CA, USA) and released in late 2022, has sparked extensive discussions about its transformative potential across various fields, including higher education.¹⁻³ Generative artificial intelligence (AI) tools such as ChatGPT excel in natural language communication, demonstrating the ability to generate high-quality, human-like text across diverse formats, from poetry to programming code.^{4,5} These tools are particularly effective in summarizing information, comparing viewpoints, answering questions, and completing a wide range of language-based tasks. Such capabilities offer significant opportunities to transform teaching and learning in higher education, particularly within health professions education.⁶⁻⁸

This potential has led educators to examine the implications of tools such as ChatGPT, particularly in academic writing and other educational applications.^{1,3} Although enthusiasm for these tools is evident, concerns about ethical implications have prompted debates about restricting their use.⁶ However, prohibiting AI tools is neither practical nor conducive to progress. A more constructive and realistic approach is to integrate these technologies responsibly into educational practices.^{3,9} For instance, ChatGPT could function as a virtual tutor, supporting learners during lectures, answering course-related questions, and fostering collaboration between teachers and students, thereby enhancing educational efficiency.³

Educators in health professions have a responsibility to ensure that AI technologies are used responsibly to enhance learning while preserving academic integrity.^{3,10} Integrating AI into clinical laboratory science (CLS) education can help learners navigate complex subjects and enhance engagement. However, addressing the limitations and challenges of AI tools is essential to optimize their use.¹¹ By doing so, educators can refine their instructional strategies, address potential misconceptions, and uphold ethical standards, leveraging AI's potential to improve learning outcomes while maintaining rigor and integrity in CLS education.

Entry-level CLS education centers on the practical aspects of clinical laboratory testing, with a strong emphasis on hands-on skills such as specimen processing, analytical techniques, and result interpretation. This foundational training equips learners with the technical expertise required to perform routine laboratory procedures and contribute effectively to patient care. In contrast, advanced CLS education, such as a Doctorate in Clinical Laboratory Science (DCLS), focuses on elevating professional competencies beyond technical proficiency. DCLS curricula emphasize advanced expertise in laboratory management, clinical research, evidence-based practice, and leadership. This advanced training prepares graduates for diverse roles, including consultancy, academic positions, and leadership in clinical laboratory management. By integrating technical proficiency with advanced professional skills, DCLS education addresses the evolving demands of modern health care and fosters leadership within the laboratory profession.

The potential applications of AI tools in CLS education, research, and clinical practice have generated considerable research interest in this rapidly evolving field. This study investigates the knowledge, attitudes, and use of ChatGPT among CLS and DCLS learners and explores its practical applications in enhancing CLS/DCLS education.

MATERIALS AND METHODS

Study Design

This study uses a mixed-methods approach, combining a quantitative cross-sectional survey with qualitative focus group discussions.

Study Setting and Participants

A total of 23 learners participated in the quantitative survey. Of these, 13 were second-year students enrolled in a 2-year, university-based CLS program leading to a bachelor's degree, and 10 were students in a 3-year DCLS program leading to a doctoral degree in CLS. The DCLS group included 5 first-year and 5 second-year learners. The didactic portion of the CLS program was conducted in person on campus, whereas the DCLS program was delivered entirely online. Both programs required clinical rotations or residencies at a clinical affiliation site.

For the qualitative component, focus group discussions were conducted with 13 in-person CLS learners and 5 online third-year DCLS learners (who were in their second year when they completed the survey). These discussions aimed to evaluate their learning experiences and outcomes after completing a ChatGPT/AI-assisted learning module integrated into both curricula.

Research Ethics and Informed Consent

This study adhered to ethical standards in research and received exemption approval from the University of

Kansas Medical Center (KUMC) institutional review board. Participants were informed about the study via email, which included a survey link and outlined the research objectives. No compensation was offered, and informed consent was obtained electronically through the survey. To ensure participant confidentiality, the survey was conducted anonymously, and no identifiable personal information was collected. Focus group discussions were held after participants completed the ChatGPT/AI-assisted learning module, with confidentiality maintained by documenting only comments related to learning experiences and outcomes without gathering personal identifiers. Participants were assured that their feedback on ChatGPT would not influence their academic grades.

Survey Instruments

Two separate questionnaires (included in the supplements) were developed by the authors using the online survey platform Qualtrics XM (2017; Seattle, WA). These questionnaires were designed after a comprehensive review of relevant sources, ensuring alignment with core content, appropriateness of questions for each domain, and consistency in the scoring pattern.^{3,7,9,10} They were tailored for CLS and DCLS participants, featuring slight variations to account for differences in course settings and the scope of clinical practice specific to each program.

The questionnaires assessed participants' knowledge, attitudes, and use of ChatGPT in both academic studies and clinical practice. Each questionnaire comprised 17 multiple-choice questions distributed across 3 domains:

1. Knowledge (5 questions): evaluated participants' familiarity with ChatGPT and general knowledge of its limitations and capabilities.
2. Attitude (6 questions): explored participants' views on integrating ChatGPT into the CLS/DCLS curricula, including its use, potential impacts on CLS/DCLS education, associated concerns and challenges, and the role of faculty in its implementation.
3. Use (6 questions): focused on participants' current and anticipated use of ChatGPT in academic coursework and future clinical practice

Demographics of Participants

Participant demographics were collected using admission data obtained at the time of enrollment in the CLS or DCLS programs. The demographic profile of the participants included gender, age, educational level, and working experience as a medical laboratory scientist (MLS). Given the small sample size and the distinct nature of the 2 programs, age, educational level, and MLS working experience were inherently aligned with the respective CLS and DCLS program structures.

Survey Data Collection

The University of Kansas Qualtrics XM survey platform was used to create the questionnaires and collect the responses. Participants were provided with survey links, detailed instructions, and assurances of confidentiality. Responses were collected from DCLS learners between April and May 2023 and from CLS learners between November and December 2023.

Focus Group Discussions

A ChatGPT/AI-assisted learning module was integrated into both the CLS and DCLS curricula. In the CLS immunohematology course (CLS 544), 13 learners were asked to develop a study guide on uncommon blood groups using ChatGPT. In the DCLS advanced topics course (DCLS 800), 5 participants in their clinical residencies compared ChatGPT-generated differential diagnoses with their own for various clinical vignettes in the “AI in Medical Diagnosis” learning module.¹²

Following the completion of their assignments, both CLS and DCLS learners participated in a 20-minute discussion to reflect on the advantages and disadvantages of using ChatGPT based on their experience. The discussion was guided by the following prompts:

1. After completing this project, what aspects went well? What areas need improvement?
2. What were the advantages of using ChatGPT for this project?
3. What were the disadvantages of using ChatGPT for this project?
4. Do you have any suggestions for using ChatGPT in future projects?

Data Analysis

Survey responses were collected and stored in Qualtrics XM (2017; Seattle, WA). After coding and scoring, the data were transferred to Microsoft Excel (2013; Redmond, WA) for analysis. Descriptive statistics, including frequency count, percentage, mean, and standard deviation, were calculated. To analyze potential differences between CLS and DCLS respondents in terms of knowledge, attitude, and use of ChatGPT, Mann-Whitney *U*-tests were performed using the R programming language’s Wilcox test function (GNU General Public Licenses). Given the small sample sizes, a bootstrapping method was also employed, generating 2000 bootstrap replicates using the Boot function in R. Bias-corrected and accelerated bootstrap confidence intervals were calculated to assess the mean differences between the 2 groups. Statistical significance was set at *P* (2-tailed) < .05.

RESULTS

Survey Results

Participant Demographics

A total of 13 CLS learners and 10 DCLS learners responded to the questionnaires, representing a 76% response rate for CLS learners and a 100% response rate for DCLS learners. The age range for CLS respondents was 22–25 years, representing senior college students, whereas DCLS respondents ranged from 27 to 40 years, representing postcollege professionals. Among the DCLS respondents, 2 (20%) were male, and 8 (80%) were female. In the CLS group, 85% of the respondents were female.

All CLS learners were in their senior year and lacked prior MLS work experience. In contrast, all DCLS learners held either a Bachelor’s or Master’s degree, were certified as MLSs by the American Society for Clinical Pathology (ASCP), and had at least 5 years of professional experience in the clinical laboratory field. These distinct demographic differences between CLS and DCLS participants contribute to notable variations in their knowledge, attitudes, and use of ChatGPT.

Scoring of Participants’ Responses

Participants’ responses regarding their knowledge, attitudes, and use of ChatGPT were summarized by program. Descriptive statistics, including frequency counts, percentages, means, and standard deviations, were calculated for the knowledge, attitude, and use domains for both CLS and DCLS respondents. Knowledge was assessed using 4 questions, each scored based on the correctness of responses (range: 0–1). Correct answers earned 1 point, whereas incorrect answers received 0 points. Familiarity with ChatGPT, which did not have a definitive correct answer, was evaluated on an ordinal scale (range: 0–4). For the attitude and use domains, responses were scored as follows: A “Yes” response earned 1 point, whereas a “No” response scored 0 points.

Participants’ General Knowledge About ChatGPT

Participants’ general knowledge about ChatGPT varied across respondents. Correct answer rates for the 4 ChatGPT knowledge questions ranged from 10% to 80% for both CLS and DCLS participants. On average, CLS learners achieved a correct answer rate of 39%, whereas DCLS learners scored higher at 55% (Table 1).

Significant differences were observed between CLS and DCLS participants in their familiarity with ChatGPT and understanding its capabilities. CLS learners reported significantly greater familiarity with ChatGPT compared with DCLS learners (*P* < .05; Table 1), with the distribution of response choices (score range: 0–4) shown in Figure 1. However, when questioned about ChatGPT’s capabilities, CLS learners were more likely to provide incorrect answers (*P* < .05; Table 1). Both groups demonstrated some uncertainty regarding ChatGPT’s limitations, including common

Table 1. Descriptive analysis of knowledge about ChatGPT across various educational programs

Questions	Program (n)	Score Mean (SD)	U	P	CI
1. Familiarity with ChatGPT	CLS (13)	2.4 (0.9)	106	.008*	(0.48–1.98)
	DCLS (10)	1.2 (1.0)			
	Program (n)	Correct Response, n (%)	U	P	CI
2. Use of ChatGPT beyond academic paper writing	CLS (11)	5 (45)	36	.12	(–0.70 to 0.12)
	DCLS (10)	8 (80)			
3. Use of ChatGPT beyond academic paper writing	CLS (10)	8 (80)	55	.65	(–0.29 to 0.50)
	DCLS (10)	7 (70)			
4. Limitations of ChatGPT	CLS (10)	2 (20)	55	.58	(–.20 to 0.43)
	DCLS (10)	1 (10)			
5. Capabilities of ChatGPT	CLS (9)	1 (11)	23	.04*	(–0.81 to –0.06)
	DCLS (10)	6 (60)			

*Statistically significant at 0.05 level. CI: 95% bias-corrected and accelerated bootstrap confidence interval.

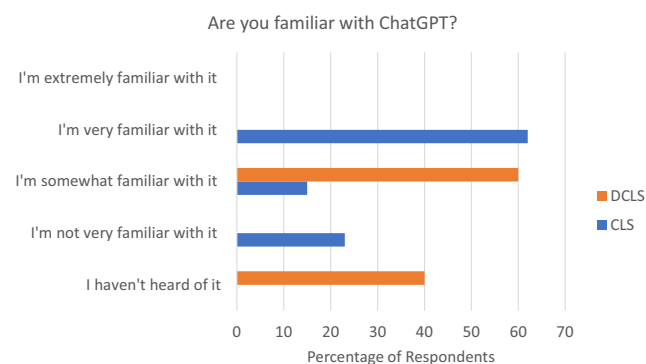


Figure 1. The difference in familiarity with ChatGPT among CLS and DCLS learners. Clinical laboratory science (CLS), n = 13; Doctorate in Clinical Laboratory Science (DCLS), n = 10.

misconceptions such as believing it could provide consultation services or reference recent real-world events.

Participants’ Attitudes Toward ChatGPT

Participants’ attitudes toward ChatGPT reflected a range of perspectives, highlighting both optimism and concerns regarding its potential applications. The “Yes” response rates for 2 questions ranged from 17% to 60% and are

summarized in Table 2. Regarding ChatGPT’s integration into educational curricula, significantly more DCLS respondents supported its integration into DCLS education, viewing it as an emerging technology with valuable application in clinical laboratory settings ($P < .05$; Table 2). Additionally, over half of the respondents believed that undergraduate CLS education is currently the most impacted by ChatGPT.

Table 3 highlights the primary concerns and challenges associated with integrating ChatGPT into CLS and DCLS education. Among DCLS respondents, academic integrity emerged as the top concern, whereas CLS respondents were most worried about the potential for inaccurate outputs. DCLS learners emphasized the need for technical expertise as a significant challenge, whereas CLS learners identified limited availability of training data as a major hurdle. Despite these differences, both groups agreed on the importance of faculty providing guidance on the critical and responsible use of AI technology.

Use of ChatGPT Among CLS and DCLS Participants

CLS learners reported significantly greater familiarity with ChatGPT and more frequent use of it in their coursework compared with DCLS learners ($P < .05$; Table 4). Notably, none of the DCLS learners reported using ChatGPT in their studies at the time of the survey. Among CLS learners who

Table 2. Descriptive analysis of attitudes toward ChatGPT across various educational programs

Questions	Program (n)	Yes, n (%)	U	P	CI
1. Is CLS education currently the most impacted by ChatGPT?	CLS (11)	5 (45)	47	.54	(–0.58 to 0.29)
	DCLS (10)	6 (60)			
2. Should ChatGPT be integrated into?	CLS (12)	2 (17)	37.5	.04*	(–0.41 to –0.03)
	DCLS (10)	5 (50)			

*Statistically significant at 0.05 level. CI: 95% bias-corrected and accelerated bootstrap confidence interval.

Table 3. The primary concerns and major challenges associated with integrating ChatGPT in CLS/DCLS education

Questions	CLE		DCLS	
	n	%	n	%
What are the greatest concerns?				
Inaccurate outputs	11	100	10	50
Academic integrity	11	55	10	80
Negative impacts on learning	11	36	10	60
Legal/ethical issues	11	18	10	40
Diversity, equity, and inclusions	11	9	10	10
What are the biggest challenges?				
Technical expertise	10	70	10	90
Limited availability of training data	10	80	10	30
Transparency	10	60	10	50
Bias and fairness	10	50	10	50

had used ChatGPT, it was primarily used for assignments such as case studies, essay writing, and presentation. They typically used ChatGPT to generate ideas, answer specific questions, and assist in finding results for tasks.

The perceived utility of ChatGPT in future clinical practice, along with its potential applications in various clinical laboratory functions, is illustrated in Figure 2 and Table 5. Nearly 60% of CLS and DCLS respondents foresee that ChatGPT/AI will be moderately to very useful in future clinical laboratories. CLS learners highlighted its potential for recognizing trends in quality control data, whereas DCLS learners emphasized its value in developing patient education materials.

Focus Group Discussion

Both CLS and DCLS participants shared their experiences with ChatGPT after completing an AI-assisted learning module, discussing its advantages and disadvantages in CLS/DCLS education. DCLS learners emphasized the potential applications of AI technologies in laboratory consulting and research, whereas CLS learners focused on ChatGPT's ability to synthesize information effectively. As shown in Table 6, CLS participants expressed concerns about inaccuracies in ChatGPT's outputs, whereas DCLS participants pointed out its lack of critical thinking capabilities—observations consistent with the survey findings. Although participants acknowledged the benefits of

Table 4. Descriptive analysis of ChatGPT use in CLS/DCLS education across various educational programs

Questions	Program (n)	Yes, n (%)	U	P	CI
1. Have you used ChatGPT in your coursework?	CLS (13) DCLS (10)	5 (38) 0 (0)	90	.03*	(0.13–0.67)

*Statistically significant at 0.05 level. CI: 95% bias-corrected and accelerated bootstrap confidence interval.

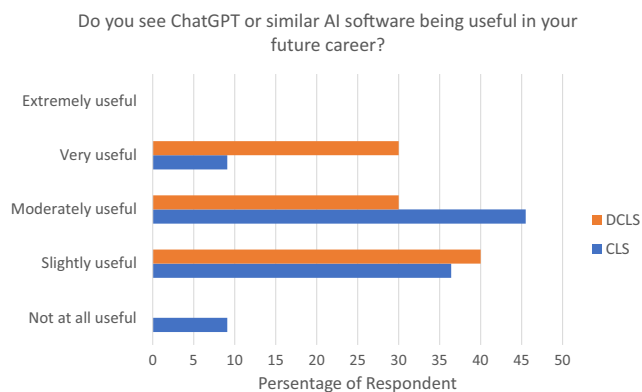


Figure 2. The difference in the usefulness of ChatGPT for future careers between CLS and DCLS learners. Clinical laboratory science (CLS), n = 11; Doctorate in Clinical Laboratory Science (DCLS), n = 10.

ChatGPT's quick content generation, most agreed that its integration into CLS/DCLS education and clinical laboratory practice should be approached with caution.

DISCUSSION

The emergence of ChatGPT has introduced a new dimension to higher education, offering significant potential to reshape teaching and learning. Despite concerns persist within the educational community regarding risks, such as cheating, plagiarism, and inaccurate output, several positive aspects of ChatGPT in teaching and learning have been identified. These include enhancing learner engagement, providing learning support, reducing teachers' workload, increasing time efficiency, and overcoming teaching barriers.^{7,8}

This study represents the first survey specifically conducted among CLS learners to explore their knowledge, perspectives, and usage of ChatGPT in the study and practice of the laboratory profession. Although the sample size accounted for only half of the total learners in the programs, the survey included both undergraduate CLS and graduate DCLS participants. Although both programs provide essential training in CLS, DCLS education emphasizes advanced clinical, research, and management skills necessary for leadership roles and advanced practice. Consequently, participants from CLS and DCLS programs exhibit differing responses regarding their familiarity with ChatGPT, its use, and its integration into professional study and practice. These differences reflect variations in

Table 5. What MLS/DCLS functions in the clinical laboratory could ChatGPT or similar software be most useful for?

Functions	n	%
MLS functions (n = 8)		
Identifying abnormal patient results	4	50
Recognizing trends in QC data	7	87.5
Interpreting test results	5	62.5
Monitoring patient outcomes	3	37.5
Reducing human errors	5	62.5
Preventing use of unnecessary tests	5	62.5
DCLS function (n = 10)		
Developing patient education materials	8	80
Developing algorithms	6	60
Doing literature searches	6	60
Laboratory use projects	5	50
Developing presentations	4	40
Developing SOAP notes	4	40

age, educational level, training processes, and clinical experiences.

From the knowledge domain analysis, we identified several misconceptions among the respondents, particularly regarding the limitations and capabilities of ChatGPT. For instance, ChatGPT cannot provide consultations, critiques, or cite third-party sources or reference recent real-world events or published material.⁶ Additionally, although ChatGPT excels in essay writing and natural

language processing, it lacks training in critical thinking, problem-solving, and reasoning skills.⁶ Reflective tasks, such as explaining thought processes, developing concept diagrams, and creating mind maps, are not well suited for AI tools at present.

CLS education emphasizes these reflective and analytical tasks to bridge the gap between academic learning and workplace skills, providing learners authentic, hands-on experiences. This is particularly relevant for DCLS practitioners with whom critical thinking and innovative problem-solving are essential for clinical practice. DCLS professionals possess a unique combination of advanced clinical knowledge and complex decision-making abilities, which are developed through specialized education and clinical residencies—tasks that remain beyond the capabilities of AI. Moreover, DCLS practitioners bring expertise in patient care coordination, quality assurance, and interpreting laboratory results within a broader clinical context—responsibilities that AI is currently unable to fully perform or replicate.

In the attitude domain, respondents expressed diverse opinions regarding the integration of ChatGPT into the CLS/DCLS curricula, highlighting both opportunities and challenges associated with the technology. DCLS respondents generally demonstrated a more positive attitude toward integrating ChatGPT in DCLS education, as reflected by a significantly higher rate of “Yes” response. This suggests that advanced laboratory practitioners, such as DCLS learners, may feel more confident using AI tools because of their extensive professional training and clinical experience. The differences in educational focus and

Table 6. Focus group discussion: advantages and disadvantages of using ChatGPT/AI—feedback from CLS and DCLS participants**CLS Participants (n = 13)****Advantages**

- User-friendly interface
- Prompt responses to queries
- Ability to generate both textual content and images

Disadvantages

- Accuracy may vary
- Information provided need further verification

DCLS Participants (n = 5)**Advantages**

- Efficiency: rapid generation of outline or algorithms
- Research support: valuable for synthesizing and summarizing large volumes of information
- Consultation aid: serves as a tool for exploring ideas or gathering initial insights
- Inclusivity: multilingual capabilities make it accessible to diverse users
- Innovation: promotes integration of emerging technologies in education and practice

Disadvantages

- Accuracy concerns: potential for incorrect or misleading information, especially in complex scenarios.
- Critical thinking limitations: lacks the ability to evaluate context or consider interferences in lab tests.
- Algorithm inadequacy: may recommend tests or solutions without adequate reasoning
- Overuse risks: can lead to unnecessary tests or reliance on AI without focused direction
- Reliability issues: misinterpretation of results could lead to unreliable outcomes in decision-making

clinical practice between CLS and DCLS learners likely contribute to their varying perspectives on the benefits, concerns, and challenges of integrating ChatGPT into CLS/DCLS education.

Respondents recognized the impact of ChatGPT on CLS/DCLS teaching and learning, and perceived undergraduate CLS education currently as being more profoundly affected. Both groups agreed that ChatGPT is particularly useful for generating ideas to support academic work. To effectively integrate AI tools into education, educators and institutional leaders must collaborate to develop clear policies, guidelines, and updated curricula on the use of ChatGPT. These measures should aim to empower learners by helping them understand the appropriate uses of AI tools, their potential to enhance learning outcomes, and their inherent limitations.⁹

In the use domain analysis, significantly more CLS learners reported using ChatGPT in their coursework compared to DCLS learners. This difference may be attributed to the survey timeline: DCLS learners were surveyed between April and May of 2023, whereas CLS learners received the survey during the last quarter of 2023. The later survey date for CLS learners provided them with a longer period to explore and engage with the technology, potentially accounting for the higher reported use rates.

The potential utility of AI in health care field has been widely recognized, particularly in areas such as personalized medicine, drug discovery, and improving diagnosis and clinical decision-making through the analysis of large data sets.⁹ In health care research and clinical practice, AI has demonstrated benefits including enhanced scientific writing, increased research equity, more efficient data set analysis, streamlined workflows, cost savings, and improved health literacy.^{2,9,13} Specifically within clinical laboratory practice, AI offers support in identifying abnormal patient results, optimizing test use, and developing testing algorithms. However, integrating AI into health professions education remains controversial because of the extensive breadth information and complex concepts learners must master. Despite this, AI presents several educational advantages, such as generating clinical vignettes of varying complexity, providing immediate, tailored feedback to learners, and supporting the development of communication skills.¹⁴

One of the major challenges associated with the use of ChatGPT and AI in health professions education is the concern over the quality and availability of the training data, which can lead to biased content or inaccurate information.¹⁵ Therefore, it is essential for educators to provide guidance to learners on how to use AI responsibly and effectively.

During the focus group discussion, CLS and DCLS participants shared their experiences after completing an AI-assisted learning project. Consistent with survey findings, CLS participants identified factual inaccuracies, potential bias, and the risk of disseminating misleading or misused information as significant drawbacks of using ChatGPT.

These concerns highlight the importance of carefully reviewing and evaluating ChatGPT-generated content throughout the learning process.² Although ChatGPT may not always produce fully accurate or creative responses, it excels at generating text aligned with user intent.⁶ Its training on large data sets of human conversations enables advanced language processing capabilities, but its limitations become evident when addressing scientific accuracy, particularly in medical queries.³ Despite these challenges, ChatGPT represents a significant technological achievement, demonstrating the potential of deep machine learning.³ The integration of AI into health professions education offers promising opportunities to enhance personalized learning experiences while emphasizing the need for critical evaluation and responsible use.

Limitations of the Study

The study included 13 senior-year CLS learners and 10 DCLS learners from the CLS department at the KUMC, representing approximately half of the department's total learner population. The online survey format may have influenced the nature and depth of participants' responses. Despite these limitations, the findings from this pilot study provide valuable insights into the potential integration of AI technology in CLS/DCLS education.

CONCLUSIONS

As ChatGPT and similar AI tools continue to advance, they hold the potential to revolutionize health professions education. The study revealed that although CLS learners were more familiar with and used ChatGPT more frequently in their coursework, DCLS learners expressed greater optimism about its integration into professional education and practice. Participants highlighted concerns about academic integrity and the accuracy of AI-generated outputs, emphasizing the need for human oversight. To ensure ethical and effective use, the implementation of ChatGPT in CLS education must be approached cautiously, with clear policies and guidelines to address potential misuse and challenges. Although health professionals remain cautiously optimistic about AI's role in clinical practice, they also recognize the irreplaceable value of human expertise in health care. A thorough evaluation of AI's real-world impact is essential to mitigate potential risks and maximize its benefits.

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