AI in Higher Education: A Literature Review of ChatGPT and Guidelines for Responsible Implementation

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ABSTRACT

Specifically, natural language models like ChatGPT present numerous advantages and disadvantages for higher education. It was trained on a massive dataset of text from the internet, allowing it to respond to a broad range of prompts. This article covers the use and potential implications of ChatGPT since its release in November 2022.

One of the main benefits is the potential of Artificial Intelligence (AI) to address challenges in learning, such as improving the transfer of knowledge, dispelling misconceptions, and promoting critical thinking skills among students. It also acknowledges concerns about its use in assessments and the potential for academic dishonesty, integrity, and malpractices. In this article, the authors discuss the high level of interest in ChatGPT and its use in education by reviewing the literature about ChatGPT usage. The article provides a set of guidelines and emphasizes the need for further research to fully understand the current practices, challenges, and opportunities of ChatGPT in higher education.

The authors conducted a thorough and systematic review of peer-reviewed journal articles to present a theoretical and conceptual perspective on ChatGPT. They acknowledge the possibility of ChatGPT's hype mirroring that of previous advancements in artificial intelligence, automation, and AI algorithms. The article offers a summary of the research findings, highlighting both the benefits and drawbacks, while also providing practical guidelines for students and teachers on how to utilize ChatGPT effectively.

Keywords—ChatGPT, OpenAI, Chatbots, Academic integrity, Generative AI, AI in Higher Education

INTRODUCTION

ChatGPT is a powerful AI-powered chatbot that gained over a million subscribers within its first week of release on November 30th, 2022. It is a variant of the GPT-3, developed by Open AI, and it has gained widespread attention due to its conversational AI interface. Despite the warnings from tech leaders such as Elon Musk and Steve Wozniak about the dangers of AI experiments, even children taking the International Baccalaureate are allowed to use ChatGPT to write their essays (Chadwick, 2023). While ChatGPT has shown promise in various fields, including education, carefully considering its potential implications and risks is crucial.

In the three months following its release, numerous scientific articles have been published on using ChatGPT in different fields and scenarios. We analyzed the materials indexed by Google Scholar, Scopus, and Web of Science.

We identified scenarios for using ChatGPT and how to interact with it to present the ways in which ChatGPT is being used in education, Medicine, finance, and research and provide suggestions for future research.

There is also an attempt to ban ChatGPT from educational institutions for fear of negatively impacting education and learning. However, attempts to ban emerging technologies in higher education have historically been destined to fail (Finkle & Masters, 2014; Spies et al., 2010), and the same would likely be true for ChatGPT. Advanced AI tools emerge rapidly, including Google's AI-powered chatbot 'Brad' and new versions of ChatGPT, which are expected to be even more accurate than their predecessors. It is important to note that these limitations are not unique to ChatGPT and apply to many other AI-powered tools. While these limitations can affect the tool's performance in some tasks, they do not negate its numerous advantages. Thus, users must use ChatGPT cautiously and understand its limits to make informed decisions about when and how to use it.

There are unprecedented prospects for ChatGPT in academia due to its extraordinary human-like capabilities. It has been used in various fields, including education, Medicine, finance, and research, and has shown promise in some areas. However, concerns exist about its use in assessments and the potential for academic cheating.

While academia is far from engulfed in an assessment integrity crisis, the potential threats of using ChatGPT in assessments cannot be overlooked. Some university programs, such as Management Studies and Information Technology, may be at higher risk. Despite its unavoidable use in some academic scenarios, there is no compelling reason to endorse its use in assessments. Students should be taught to think and write critically, not to copy and paste.

It is imperative to adapt in any field and be able to use new technologies as well as this new artificial intelligence technology in our fields of interest. In this article, we present materials that have appeared on the use of ChatGPT in areas such as education in general only. Also in this material, we perform an analysis of Web of Science indexed publications and Scopus indexed publications through which we want to present the high degree of publication of materials that use ChatGPT.

METHODLOGY

This review aims to systematically search high-quality theoretical research materials to contextualize the scope of this research and identify research gaps in this study.

A narrative literature review has been carried out, focusing on describing and discussing the topic from a theoretical and conceptual viewpoint (Rother, 2007). To be more inclusive and systematic in the search for articles, an explicit search strategy and criterion were devised. A systematic search of full-text peer-reviewed journal articles was conducted via one of the researchers' institutional online libraries, powered by Major databases (Science Direct, Springer, Web of Science, Taylor and Francis, Research Gate, EBSCOhost database) and other major academic publishers were also searched.

Keywords and phrases used for the search were: "ChatGPT". AI is not just ChatGPT only, but we are using the term ChatGPT as it is built on top of AI technologies, and it has been a hot topic for the last six months. It is reasonable to assume that ChatGPT hype may follow the footsteps of its elder siblings, such as, Generative AI, 'artificial intelligence', and 'AI' etc.

The search was limited to full-text articles in scholarly peer-reviewed journals, and only articles published between November to May 2023 were chosen. This date range provided the opportunity to review existing knowledge that is as current as possible. A possible caveat to the search was that as the keywords in journal articles are not based on a standardised list, it is possible that some of the articles during the identified period may have been omitted. An initial search of the online database revealed a total of 3750 articles. The articles that were not relevant (based on exclusion criteria and rationale) were excluded. Then the duplicate

articles were removed. Articles that only focused on "ChatGPT" were selected rather than other Open AI platforms such as synthesis, Research Rabbit, Consensus, proprietary platforms and so forth, hence were particularly pertinent. Finally, eight articles were deemed to be suitable for the literature review purely in education context. These eight articles solely focused on ChatGPT usage in higher education.

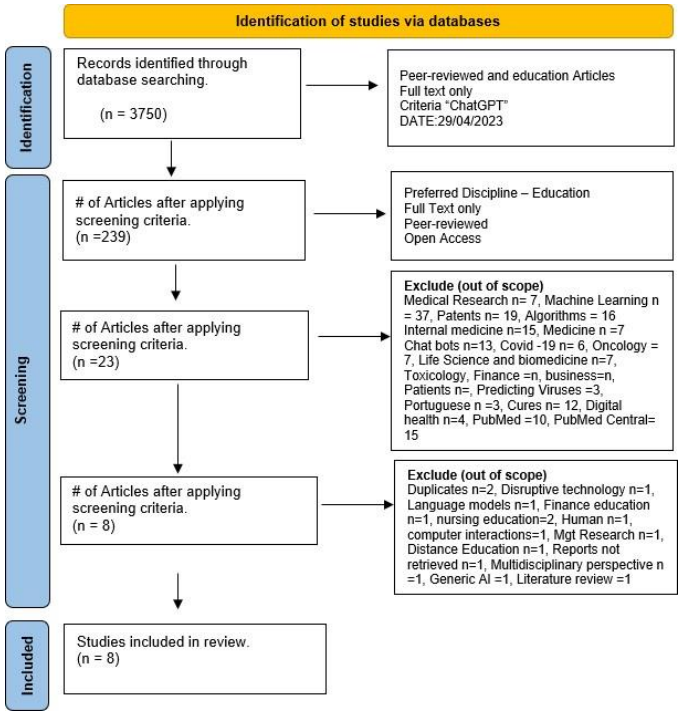

Fig. 1 Prisma flow chart indicating the results of searchers.

Figure 1 summarises the identified studies, in alphabetical order of author's surnames, along with the key emphasis of the study, the research method, and the location of the study. The criteria followed in selecting the articles from the databases for this study are as follows:

- Does the paper discuss topics related purely on ChatGPT?
- Does the paper discuss Higher Education as an area ChatGPT has been used?
- Does the paper discuss the problems and challenges of ChatGPT?

Table I: Short-Listed Articles For The Rewiew

Author/s Location	Key emphasis of the study	Research method	Journal	Publisher
Farrokhnia M et al, Netherlands	Strengths, weaknesses and to discuss its opportunities for and threats to Higher Education	Using SWOT analysis as a analysis method	Innovations in Education and Teaching International	Routledge
(Cotton et al., 2023), UK	Examines the opportunities and challenges of using ChatGPT in higher education, discusses the potential risks and rewards of these tools. Difficulties of detecting and preventing academic dishonesty and suggests strategies that universities can adopt.	Applying Policy	Innovations in Education and Teaching International	Routledge

Geerling W et al, USA, INDIA	The findings show that ChatGPT can provide answers that exceed students' mean responses across all institutions. The emergence of artificial intelligence presents a significant challenge to traditional assessment methods in higher education.	Quantitative	The American Economist	SAGE Journals
Kooli C, Canada	This paper explores the potential use of AI systems and chatbots in the academic field and their impact on research and education from an ethical perspective.	Qualitative	Sustainability	MDPI
Hwang G and Nian-Shing Chen, Taiwan	The "programming prompt" refers to the ability to guide GAI applications to complete tasks following a sequence of logical instructions.	Using GAI for education	Educational Technology & Society	airiti Library
Lim, Weng et al, Malaysia, Australia	Generative AI as a game-changer for education reformation in management education.	Using critical analysis as a method and paradox theory as a theoretical lens	The International Journal of Management Education	ELSEVEIR
Will Yeadon et al, UK	AI-generated short-form essays achieving First-Class grades on an essay writing assessment from an accredited, current university Physics module.	Quantitative	Physics Education	IOPScience
Ahmed Tlili et al, China, Turkey, USA, Australia	The investigation of user experiences through ten educational scenarios revealed various issues and truthfulness of ChatGPT, privacy misleading, and manipulation.	Case study	Smart Learning Environments	Emerald

Benefits and Uses of ChatGPT as an Educational Tool for Learning and Teaching

In recent years, there has been a growing interest in the use of chatbots and artificial intelligence (AI) in various fields, including education and research. ChatGPT, a large language model based on the GPT-3 architecture, is one such AI-based tool that has shown great promise in enhancing teaching and learning experiences.

According to Tili et al. (2023), ChatGPT has been used to create literary texts such as essays, stories, poems, and articles. Users have found it helpful in explaining complex topics in an easy-to-understand language. Additionally, education experts have suggested that students can use ChatGPT to generate model answers and that teachers can use it to identify the knowledge and skills that should be included in their respective subject courses.

Cotton et al. (2023) mentioned that ChatGPT could facilitate collaborative learning among students by creating student groups that would enable them to work together on projects and assignments. Other than that, students with physical and mental disabilities benefit from ChatGPT, as it allows remote learning.

Dwivedi et al. (2023) found that integrating chatbots into an online platform used in a university course can help facilitate student-teacher interaction and improve the overall learning experience. Kuhail et al. (2022) also found that chatbots can provide instant feedback and support and personalized learning experiences, thereby increasing student engagement and motivation.

Students enrolled for higher education from non-English speaking countries could benefit from features of ChatGPT such as language editing and translation, the potential to refine the content with human prompts, and provide the information within a few seconds. These students could overcome the language barriers in academic work (Lim et al., 2023).

Geerling et al. (2023) have identified the ability of ChatGPT to provide sophisticated and accurate responses to complex questions in higher education. They also noted that chatbots could enhance peer communication skills, improve learning efficiency, and help instructors manage large in-class activities. Farrokhnia et al. (2023) have highlighted the numerous strengths and opportunities of ChatGPT, including personalized responses, access across multiple platforms, and the ability to summarize information quickly.

Yeadon et al. (2022) mentioned that ChatGPT could produce countless original examples that teachers can demonstrate. When ChatGPT is further developed, it can be used as a one-to-one tutor. In their review, Lim et al. (2023) stated that certain researchers have identified ChatGPT as a friend, philosopher, or guide because of its ability to interact more human-like. They further mentioned that ChatGPT provides an opportunity for educators to figure out gaps in student learning and for students to have timely feedback.

Hwang and Chen (2023) mentioned that ChatGPT could be used for research as it can collect data, analyse a large amount of data, and come up with conclusions and predictions. In addition, it can summarize the results and produce reports, including tables and figures. Students can use this time to focus more on other essential aspects of the research.

Overall, ChatGPT has the potential to revolutionize the way education and research are conducted. It can provide personalized feedback, reduce teaching workload, and facilitate student-teacher interaction. However, caution needs to be exercised to ensure that over-reliance on chatbots does not lead to a decline in critical thinking skills and independent problem-solving abilities.

Problems and Limitations of ChatGPT

With the rise of technology in education, there is a growing concern that students may become too reliant on it, leading to decreased critical thinking skills and independent problem-solving abilities. Kooli (2023) argues that this overreliance on technology can hinder the ability to think critically and creatively. Students may rely too heavily on the automated processes and solutions technology provides, leading to a lack of engagement and initiative. It is vital to ensure that students develop critical thinking skills that can be applied in various contexts.

ChatGPT is not highly independent, and its responses rely on the quality and quantity of prompts it receives. It only provides more elaborative answers when the prompt is explicitly requested. Other than that, it cannot include references unless requested (Lim et al., 2023).

Chatbots have become increasingly popular in research and customer service, but they lack the ability to understand context and nuance. According to Kooli (2023), this can lead to errors and misinterpretation of data. Chatbots are also limited in terms of creativity, critical thinking skills, and emotional intelligence, which are essential for conducting research. Researchers must remain vigilant when using chatbots to ensure the accuracy and reliability of their findings.

ChatGPT's ability to generate content quickly and efficiently has raised concerns about widespread cheating on non-proctored exams and assignments. Geerling et al. (2023) argue that this may make it difficult to detect plagiarism. Educators must ensure adequate measures to prevent cheating, such as proctored exams, plagiarism detection software, and other forms of academic integrity.

The capabilities of ChatGPT to generate responses are limited to the training it received to generate responses. It could create responses for specific prompts and within the limits of data already fed (Lim et al., 2023). It works according to the tool's algorithm, which predicts the most likely combination of words rather than independent and unbiased review and citing specific sources (Lim et al., 2023).

Online learning has become increasingly popular, but it may lead to equity issues for students in remote or online classes when assessment is scheduled on campus. Geerling et al. (2023) also note that logistical challenges associated with large lectures may arise due to the difficulties in grading and assessing students effectively. Educators must ensure that they have adequate measures in place to ensure fair and equitable assessment for all students.

While ChatGPT can generate responses quickly and efficiently, its lack of a deep understanding of the meaning of words and evaluation of response quality can limit its ability to provide high-quality responses, particularly for tasks that require a nuanced understanding of specific domain knowledge. Farrokhnia et al. (2023) argue that this may limit the usefulness of ChatGPT in certain contexts, such as research and academic writing.

The use of ChatGPT in contract cheating is a significant concern, as it can be challenging to detect. Cotton et al. (2023) argue that this may give some students an unfair advantage over others, potentially leading to inequities in the assessment process. Educators must remain vigilant and take steps to prevent contract cheating, such as using plagiarism detection software and creating assignments that require original thinking and analysis.

Certain academic institutions and states impose restrictions on Chat GPT or even completely banned. However, with these decisions, the interest and curiosity of students and the public in ChatGPT will increase. On the other hand, when certain states or academic institutions banned the use of ChatGPT while several other states and institutions allowed it, this created unrest among people and caused ethical issues (Lim et al., 2023).

ChatGPT's ability to generate content quickly and efficiently may perpetuate discrimination in education and democratize plagiarism in education and research. Farrokhnia et al. (2023) note that ChatGPT can generate research studies with fabricated data that may not be detectable by reviewers. This highlights the need for educators and researchers to remain vigilant and ensure the accuracy and integrity of their work.

Lim et al. (2023) point out that ChatGPT generates correct information but is not point out that in existing literature, it was mentioned that ChatGPT is capable of gain marks enough to pass the assessments in different higher education disciplines such as Business, Law and even in Medicine. Therefore, educators must redesign the curriculums to remove such assessments and include assessments which require more critical thinking.

Tlilli et al. (2023) mention that three university teachers from different universities-initiated conversations with ChatGPT with the same prompt, and surprisingly three individuals received three different responses. One of the teachers received a well-organized answer, while the other two answers were not very well organized. With this experience, users question how to ensure fair access for all users.

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The current plan to make ChatGPT available for free for a limited period and then charge for premium access goes against the mission of Open AI to ensure that Generative AI benefits everyone. Generative AI has the potential to democratize access to knowledge, but the limited access to generative AI tools creates equality and accessibility issues. This could have a negative impact on students who cannot afford to pay for the premium version of ChatGPT. It is essential to investigate whether academic institutions can afford to pay for the premium version on behalf of students, especially in developing countries where affordability may be an issue. Lim et al. (2023) recommend consider these factors before implementing the premium version of ChatGPT.

Summary of Pros and Cons

The use of ChatGPT in higher education has garnered significant attention in recent years. This summary presents an in-depth analysis of the pros and cons associated with implementing AI technologies in the academic realm.

Table II: Summary Of Pros And Cons

Pros	Cons
Academic/ Scientific Writing	Risk of incorrect/ Inaccurate information
Able to get support for research- data collection, data analysis etc.	Reduce users' creativity, critical thinking, and problem-solving ability.
Generate model answers.	Transparency issues
Educational benefits in various fields	Citation/ Reference inaccuracy or inadequate referencing
Facilitate remote learning.	Legal issues, and Copyright Issue
Improve student- teacher interactions.	Restricted knowledge before 2021
Free availability.	Over detailed content
Increase study engagement.	Risk of misinformation spread.
Facilitate collaborative learning with peers.	Credibility of research and limit its impact.
Automate repetitive and time-consuming tasks.	Ethical Issues (bias, Plagiarism, data Privacy and Security)
Freeing up researchers to focus on more complex and important aspects of their research.	Data privacy, data security, and exploitation of participants
Create Literary text.	Lack of Originality
Helpful in various educational practices	Free version will no longer available in future
enhance peer communication.	Generate different responses for same prompt.

ChatGPT usage guidelines

The use of ChatGPT and other generative AI tools in education raises questions about their potential benefits and drawbacks. Yeadon et al. (2022) note that ChatGPT's continuous improvement can enhance the academic value of the responses and enable users to receive excellent grades. As a result, educators must amend their strategies for using AI tools to keep pace with the latest advancements in technology.

To ensure ethical use of these tools, experts from different fields such as education, data security, and psychology should be consulted to understand their ethical use in education. Based on the reviewed articles

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and discussions, appropriate guidelines and policies should be developed for the use of ChatGPT in education. Author has summarized some guidelines to consider:

- *Raise awareness of the potential uses and limitations of generative AI tools*: Rather than banning them or making them a central focus of entire curriculums, and educators should utilize them in class and lead discussions with students about their advantages and disadvantages.
- *Use ChatGPT as a complementary tool:* Chatbots should not be used as a substitute for human researchers but as a complementary tool to aid in research under the supervision and control of human experts.
- *Incorporate proctored, in-person assessments*: Teachers should reintroduce proctored, in-person assessments, augment learning with chatbots, and increase the prevalence of experiential learning projects that artificial intelligence struggles to replicate.
- *Develop ethical principles and guidelines for using ChatGPT in higher education*: Future studies should focus on addressing ethical issues by developing ethical principles and guidelines for using ChatGPT in higher education.
- *Promote originality and creativity in assignments*: Teachers can create assessments that are open-ended and encourage originality and creativity, making it more difficult for students to use ChatGPT to complete their assignments.
- *Prevent plagiarism*: Strategies to prevent plagiarism when using ChatGPT or other artificial intelligence language models in academic writing include educating students on plagiarism, requiring drafts of work to be reviewed, using plagiarism detection tools, setting clear guidelines for use of AI language models, and closely monitoring student work for irregularities in language, sources and citations, originality, factual.
- *Provide personalized feedback*: Teachers should carefully consider the type of question prompts to give personalized feedback to students since when the feedback is solely critical but not positive, students typically do not uptake the feedback because of psychological and emotional reasons.
- *Use formative assessment*: The learning process can be monitored through authentic assessment practices such as self-assessment, reflection reports, portfolios, and peer feedback.

By acknowledging and addressing the potential ethical issues and limitations of ChatGPT, educators can help their students learn how to leverage these tools in meaningful ways. Ultimately, through critical engagement with these tools, we can fully realize their potential as valuable educational resources.

CONCLUSION

In conclusion, the use of AI in education is a complex issue that requires careful consideration of its benefits, risks, and ethical implications. While AI has the potential to revolutionize education and research, it also raises significant concerns about fairness, bias, and accountability. Therefore, further research is needed to explore the potential benefits of AI in education and how it can be integrated effectively into teaching and learning processes.

To maximize the potential of AI in education, stakeholders must collaborate to develop policies, guidelines, and ethical frameworks that promote transparency, responsibility, and inclusivity. This will require ongoing public discussions and research to identify potential risks and benefits and ensure that AI tools are used effectively and responsibly. By working together, we can unlock the full potential of AI in education while mitigating the risks and ensuring a fair and equitable learning environment for all.

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