

Short Article

ChatGPT for education and research: A review of benefits and risks

Sarin Sok

*The University of Huddersfield
Huddersfield, United Kingdom*

Kimkong Heng

*Paññāsāstra University of Cambodia
Phnom Penh, Cambodia*

Abstract

Generative Pre-trained Transformer (ChatGPT) is an artificial intelligence (AI) tool that can quickly generate detailed responses to prompts and follow-up questions. This emerging AI tool was launched in November 2022 by an American AI research laboratory, called OpenAI, using large language models. In this article, the benefits and risks related to the use of ChatGPT in education and research are discussed. The article argues that ChatGPT has at least five main benefits, such as creating learning assessment, enhancing pedagogical practice, offering virtual personal tutoring, creating an essay or research article outline, and brainstorming ideas. However, there are risks related to academic integrity issues, unfair learning assessment, inaccurate information, and over-reliance on AI. The article offers a set of recommendations for the effective use of ChatGPT for educational and research purposes.

Keywords: ChatGPT; benefits; risks; education; research

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✉ Sarin Sok
sarinsok99@gmail.com

Introduction

With the rapid advancement of technology and globalization of interconnectedness, artificial intelligence (AI) has substantially influenced many sectors, including education. In various ways, AI has the capability to promote advancement and innovation in educational settings (Zhai, 2022). One of the emerging AI tools that can be employed for educational purposes is ChatGPT (Generative Pre-trained Transformer). ChatGPT is an AI chatbot developed by an American AI company, called OpenAI. The number of ChatGPT users has remarkably increased by over one million in just a week after its launch on November 30, 2022 (Mollman, 2022). ChatGPT is a large language model (LLM) with the capacity to produce suitable responses to context and engage in natural-sounding conversation (Deng & Lin, 2022). At present, there are three versions of ChatGPT: ChatGPT (a free version), ChatGPT Plus (a premium version), and GPT-4 (an upgraded version) (OpenAI, n.d.).

In educational settings, ChatGPT not only can assist in designing assessments, producing essays, and translating languages, but it also enables users to pose and answer a variety of questions, summarize texts, and interact with it like peers (Sok, 2023). Baidoo-Anu and Ansah (2023) claimed that such a model could also demonstrate creativity in writing on almost any topic from a single paragraph to a full research article that can be seen as convincing or almost convincing. Likewise, Atlas (2023) argued that tertiary education could benefit greatly from the usage of ChatGPT and other language models, which can be applied in a wide range of contexts, including writing aid, language acquisition, research, and administration. Thus, it could be argued that ChatGPT has the potential to be a useful tool for education and research.

Despite a number of possible educational advantages, many researchers have argued that ChatGPT also presents significant downsides (Baidoo-Anu & Ansah, 2023; Cotton et al., 2023; Gordijn & Have, 2023). A study by Mogali (2023) found that, with an initial evaluation, ChatGPT did not consistently respond with accurate information when questioning about anatomical facts in its current version. Therefore, it becomes apparent that the existence of this leading AI tool has both benefits and limitations.

Drawing on secondary sources, this article aims to discuss both benefits and drawbacks of using ChatGPT in education and research. It begins by highlighting key benefits that ChatGPT can offer, followed by potential risks resulting from the use of ChatGPT in its initial stage. The article ends with recommendations for the effective use of ChatGPT for education and research.

Benefits of ChatGPT

Creating learning assessment

Given the fact that assessment is the backbone of quality education, ChatGPT enables academic staff and teachers to have an innovative and flexible way to create learning assessments with real-time feedback and reports. Zhai (2023) contended that teachers could create learning assessment items using ChatGPT while saving time and effort and potentially improving the quality of the questions by adhering to a standard framework. With the abilities given by ChatGPT, teachers could develop open-ended question prompts that are aligned with the learning objectives and success criteria of the teaching lessons (Baidoo-Anu & Ansah, 2023). Given that the majority of teachers spend plenty of time creating quizzes, monthly tests, and examinations, it is clear that there is an opportunity for educators to lessen the pressure of assessment by receiving assistance from ChatGPT.

ChatGPT can also offer an automatic grading system with helpful feedback, which is essential for improving students' learning outcomes. ChatGPT could be leveraged to semi-automate students' work grading through identifying both weaknesses and strengths of the task in question (Kasneci et al., 2023). These could include research articles, academic essays, and a wide range of writing forms of assignments. In this sense, it is useful for educators to adapt the reports produced by such a model to provide helpful feedback to students in formative or summative assessment contexts. Kasneci et al. (2023) added that a more accurate assessment of a student's learning obstacles and development can be made with the aid of ChatGPT, which can assist teachers in pinpointing the areas where learners face difficulties. As a result, it is preferable for teachers to reduce workloads and shift their primary attention to developing innovative lesson plans, participating in teacher professional development, and offering coaching and mentoring support to each student individually, all of which are

essential to improve students' learning performance and can be supported by ChatGPT.

Enhancing pedagogical practice

As there are a number of innovative features offered by ChatGPT, it is advantageous for teachers to improve pedagogical practices by designing and integrating interactive classroom activities. Rudolph et al. (2023) argued that with the assistance of ChatGPT, it is possible for educators to design teaching techniques creatively by adopting a flipped classroom approach. This method allows students to study both in the classroom and remotely, which encourages them to learn independently. Atlas (2023) claimed that not only could ChatGPT assist teachers in developing their quizzes, exams, and syllabuses, but it could also enable them to produce lesson plans, presentations, and other resources as well as to evaluate students' work. This perhaps encourages teachers to modify and edit these materials in more creative and engaging ways to meet students' learning needs because they have more time to reflect and develop new teaching techniques and activities.

The platform for interactive communication given by ChatGPT enables teachers to establish more classroom-engaging activities. Herft (2023) noted that teachers could “use ChatGPT to generate visual aids, such as slides or worksheets, that clearly outline the learning objectives and success criteria for a lesson” (p. 2). It is worth noting that these instructional materials have a strong likelihood of attracting students to learn and involve themselves in a classroom learning environment. Moreover, questions and prompts generated by ChatGPT potentially encourage students' involvement with diverse levels of knowledge and skills, as well as stimulate their problem-solving and critical thinking skills (Kasneci et al., 2023), which is pivotal for 21st-century education. It is convinced that this emerging AI tool plays an essential role in promoting classroom interaction.

Offering virtual personal tutoring

Unlike traditional tutoring methods, ChatGPT is a potential tool that can be used as an ideal personal tutor for students. Mhlanga (2023) and Qadir (2022) stated that students could receive feedback and individual answers by asking

ChatGPT that can offer intellectual tutoring services virtually. In this sense, it is convenient for students to ask ChatGPT to assist them anytime they need with their homework, assignments, projects, and even math exercises. This approach may empower students to become autonomous and self-directed learners. Similarly, ChatGPT is capable of discussing a variety of topics in addition to responding to students' queries (Baidoo-Anu & Ansah, 2023). However, to gain the most of ChatGPT's assistance, it is crucial for educational institutions to develop concrete guidelines and introduce them to students so that they are explicitly aware of how to use it efficiently and responsibly.

Creating an outline

Researchers can provide prompts to ChatGPT and ask it to create an outline for an article or other forms of writing. Kasneci et al. (2023) argued that it is helpful for students to use such a model to help organize ideas for their research and writing. In this regard, students can effortlessly suggest prompts so that ChatGPT can generate an outline immediately. However, some of the contents may need to be adjusted by researchers or students for the outline to be usable. In fact, some researchers have already started using it to generate outlines for their writing (see Qadir, 2022; Zhai, 2022). Moreover, ChatGPT can quickly create an outline of research articles, enabling researchers to quickly and precisely grasp the main points (Kasneci et al., 2023).

Brainstorming ideas

ChatGPT is crucial for research, particularly in helping to brainstorm ideas for writing. Some researchers have already begun to use ChatGPT to write research articles (see King & ChatGPT, 2023; Stokel-Walker, 2023). Zhai (2022) used ChatGPT to generate ideas and wrote an entire paper, entitled 'ChatGPT User Experience: Implications for Education.' He noted that the written paper was just slightly edited and reorganized by him. It was concluded that "ChatGPT has shown a powerful ability to organize and draft components of articles" (Zhai, 2022, p. 9). Thus, there is no doubt that this newly developed AI-generated tool has a significant capacity to help researchers brainstorm ideas for research articles, although it is vital that researchers should adjust and verify the ideas generated by ChatGPT to avoid mistakes or misleading information (Gordijn & Have, 2023; Mogali, 2023).

Risks of ChatGPT

Academic integrity issues

Despite the myriad of advantages in the educational landscape, ChatGPT also tends to present some notable risks. Due to the capability of ChatGPT in generating outputs based on various prompts submitted by users (e.g., students), it could be unethically utilized, that is, its use may be against the standard of academic integrity. It may lead to a case of plagiarism when AI is leveraged to produce a response or article unless its use is declared (Kleebayoon & Wiwanitkit, 2023) or the sources are properly cited (Thurzo et al., 2023). If students fail to cite the sources produced by chatbots in their assignments, it could result in academic misconduct and dishonesty detrimental to their academic success in the long run.

Unfair learning assessment

With the emergence of AI-generated tools like ChatGPT, assessment of students' work might be of concern as ChatGPT use possibly brings about biased evaluation. To date, researchers have argued that the textual outputs produced by ChatGPT and humans could be challenging to distinguish (Cotton et al., 2023; Else, 2023; Shiri, 2023). Mhlanga (2023) contended that in light of ChatGPT's ability to generate appropriate essays quickly, teachers were concerned about the possibility of students utilizing it to outsource their assignments. Due to this, the students who use this advanced application to generate their assignments, homework, or projects are more likely to achieve higher scores than those of their peers. Notably, a study on "Analyzing Early Reactions to the Innovative AI Chatbot on Twitter" by Taecharungroj (2023, p. 6) noted that "one user reported students using ChatGPT to write a school essay and then taking credit for the resulting A+ grade, while another found that ChatGPT passed a practice bar exam with a score of 70% (35/50)." It is plausible that this could negatively impact students' emotion and the status of educational institutions and thereby should be considered to avoid biased evaluation.

Inaccurate information

Given the fundamental limitations of ChatGPT, both students and teachers might experience the risk of using misleading information produced by this innovative application. Many researchers pointed out that information generated by ChatGPT is feasible to show the factual errors (Baidoo-Anu & Ansah, 2023; Gordijn & Have, 2023; Qadir, 2022; van Dis et al., 2023). Some examples of these errors include inventing articles that have not existed and producing inaccurate responses (Baidoo-Anu & Ansah, 2023). This might cause harmful effects on students or teachers when they use this information for work that may lead to misunderstanding. Qadir (2022) posited that false information could be made by using ChatGPT due to several reasons, including the prompts or inputs suggested by users, the caliber of the training data, and the application's limitations. In this sense, it is imperative that teachers and students critically analyze the answers produced by such an intelligent AI-generated application to ensure the effectiveness and efficiency of the use of ChatGPT.

Over-reliance on AI

Over-reliance on AI may be an issue. Given the convenience of using ChatGPT, students, especially those who work on last-minute assignments, may use this tool as a means to create their work entirely without using their analytical thinking and decision-making skills. Using ChatGPT has been argued to have a harmful impact on students' development of essential skills, including critical thinking skills (Kasneci et al., 2023; Mhlanga, 2023; Shiri, 2023), problem-solving skills (Kasneci et al., 2023), and imagination as well as research abilities (Shiri, 2023). As these skills play a pivotal role in students' academic and professional success, using ChatGPT may lead to a number of other negative consequences on students, such as a lack of innovation and poor decision-making abilities.

Conclusion and recommendations

In the preliminary stage of using ChatGPT, it can be concluded that this sophisticated generative AI tool has a high possibility of being beneficial for students, educators, and researchers. These include developing formative and

summative evaluation, enhancing pedagogical practices, supporting personalized online learning or tutoring, generating academic outlines, and brainstorming ideas for articles or essays. However, it is imperative to bear in mind that such a transformative AI tool is not without its shortcomings which include the risk of academic integrity, biased learning evaluation, factual inaccuracies, and over-reliance on AI that can result in limited development of important life skills. As a result, these issues should be addressed to allow for the effective use of this AI tool for education and research.

Considering the risks of ChatGPT use, some recommendations are necessary. First, although some educational institutions have blocked ChatGPT, this leading emerging AI tool should be considered in education and research. Students, teachers, and researchers should be encouraged to explore the use of ChatGPT to gain maximum benefits from it. However, close attention should be paid to guarantee inclusive, equitable, transparent, and ethical use of ChatGPT.

Second, in terms of using this tool to assess students' work, it is pivotal for educational policymakers, educational leaders, and teachers to work closely in order to revise the assessment standards to prevent unfair learning evaluation. In this respect, Cotton et al. (2023) have suggested that the emerging assessment should demand students to use their analytical, critical, communicative, and problem-solving abilities. Moreover, it is advised to consider applying formative assessment more than the summative one by designing engaging activities which require students to debate, discuss in groups, conduct presentations, and work as a team (Cotton et al., 2023). Furthermore, it is essential that students prepare academic reports that include citations, references, and a specific context if a final report is employed as the primary assessment.

Third, it is essential for educational institutions to develop training contents and deliver them to both teachers and students to use ChatGPT productively while maintaining accountability and ethics to uphold academic integrity. This means that instead of banning the use of ChatGPT, there should be training or guidance on how to effectively use this AI tool for education and research purposes.

Fourth, in order for schools and universities to enhance the quality of education, action research should be conducted to further examine the effectiveness and efficiency of integrating this intelligent application into education. Likewise, funding for research into the use of AI tools like ChatGPT for education and research should be made more available so that researchers may be able to examine how to take maximum advantage of ChatGPT for educational purposes.

Fifth, while receiving various assistance from ChatGPT, it is advisable that students should be vigilant. It is perhaps beneficial for students to check, analyze, and edit responses generated by this AI application to ensure its accuracy. At the starting point, students should get familiar with the application's strengths and drawbacks while keeping in mind academic integrity guidelines and the repercussions of academic dishonesty (Rudolph et al., 2023).

Finally, it is suggested that researchers should start utilizing ChatGPT in order to better understand its advantages and flaws for academic purposes. It is essential to just use this tool for brainstorming and outlining, not to produce entire research articles, in order to prevent intentional or unintentional academic misconduct. That said, when using this tool for generating ideas, it is vital to ensure that all the information generated is accurate by checking and editing it, as well as requesting additional responses through follow-up prompts. Otherwise, the use of ChatGPT may be a curse rather than a blessing.

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Conflict of interest

None.

The authors

Sarin Sok is currently a Chevening scholar pursuing a Master of Education at the University of Huddersfield, the United Kingdom. Prior to this, he completed a Master of Education at the University of Cambodia and worked in the educational and corporate sectors. His research interests center on technology-enhanced learning, learning organization, mentoring and coaching, and educational leadership.

Email: sarinsok99@gmail.com

Kimkong Heng, PhD, is a Lecturer at the Paññāsāstra University of Cambodia. He is also a Co-founder and Editor-in-Chief of the Cambodian Education Forum, a National Technical Advisor at the Department of Scientific Research, Ministry of Education, Youth and Sport, Cambodia, and a Visiting Senior Research Fellow at the Cambodia Development Center. His research interests include TESOL, research engagement, academic publishing, and higher education.

Email: kimkongheng@gmail.com

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