


ChatGPT and its impact on education

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ABSTRACT: In understanding the role and potential of ChatGPT in education, this article suggests that ChatGPT has the potential to enhance the education system by providing instant feedback, personalised learning experiences and 24/7 availability. Furthermore, it aims to analyse the different perspectives on ChatGPT and establish a research foundation that contributes to future research, for instance, questions around who is responsible for the content generated by ChatGPT, and how it should be used to assess student learning. The article offers valuable insights for both students and educators looking to understand the role of ChatGPT in education and the future of the education system. It provides the starting point for further discussion and research into the role of ChatGPT in education and the potential it holds to revolutionise the way we learn and teach. The article concludes by calling for further research to fully understand the impact of ChatGPT on education and to determine the most effective ways to integrate it into the classroom.

KEYWORDS: AI, AI safety, AI ethics, assessment, learning, teaching

Introduction

Technology has a deep impact on our lives and the recent development of artificial intelligence (AI) is part of it. AI is persistently advancing and being applied in various industries. The introduction of ChatGPT, in November 2022, has caused a significant commotion. People are starting to worry about the potential negative impacts that large language models (LLMs) like ChatGPT could have on society, such as fake news, plagiarism and social security issues (Guo et al., 2023). Nevertheless, both prospects and impediments depend on how this technology is applied or implemented. One common challenge is the time and effort required to input content into a computer. To address this, AI technology has been developed to assist users in overcoming creative barriers and generating written content or code, resulting in the beginning of AI writing assistants. The developments in technology and AI are changing how we think and act, hence, educators should be ready to respond to this new trend with advanced guidelines and curricula.

Background and context

In 2019, Microsoft partnered with OpenAI and invested \$1 billion in developing artificial general intelligence (AGI) and building new Azure supercomputing technologies jointly. In 2022, Microsoft announced an additional investment of \$10 billion in ChatGPT-owner OpenAI, making them a 49% stakeholder (Reuters, 2023). Microsoft has incorporated GPT software in its Bing search engine to make it more intelligent and compete with its rival, Google (Bass, 2023). Microsoft has launched its project called, Copilot, which embeds ChatGPT and other AI technologies into the Microsoft Office applications like Word, Excel and PowerPoint (McCallum, 2023). The MS Teams Premium

is powered with a generative pre-trained transformer (GPT) which will automatically generate meeting notes, recommend tasks and personalise the information that is most important to the user, even if the user misses the meeting (Herskowitz, 2023).

There are different AI writing assistant tools available online. Many people use these tools to improve writing such as rephrasing, spell check, grammar check, formatting, idea generation and content generation. In simple terms, it is computer software that helps you write content based on the probe or input you supply and that allows it to search large databases and create essays, legal briefs and poetry. Most AI writing assistants use OpenAI's GPT model, a general-purpose conversation chatbot. It uses natural language processing (NLP) and machine learning to string together the sentences by predicting the next best word for the words that have just been placed in the sentence while still keeping in context.

Content-generating applications are often linked to a wide range of online data sources such as articles, libraries, e-books, Wikipedia, blogs and more. ChatGPT can be used to create marketing copy, landing pages, blog topic ideas, slogans, brand names, lyrics and even full blog posts. This allows users to save time by focusing on other essential matters in their professional lives. In layperson's terms, users can generate high-quality content with minimal effort. Furthermore, ChatGPT is able of demonstrating critical thinking skills, making it a potential threat to the integrity of online exams, particularly in tertiary education, hence returning to invigilated and oral exams could form part of the solution to this threat (Susnjak, 2022).

Impact on education and educators

ChatGPT is expected to impact every industry and the entire human race. The potential impact on the education sector is yet

to be assessed. We start with the positive impact, like using AI to assist in developing teaching materials, talking points, emails, reviews, novels, generating ideas, etc. Schools use AI technology for academic and administrative purposes. These are:

- Adaptive learning — This pedagogical approach utilises AI technology to dynamically adapt the content and difficulty level of a learning experience in response to a student's progress or performance.
- Personalised recommendation/individual instructions/early identification of learning needs — Using AI technology, the school can analyse students' learning styles and interests to provide recommendations for content and resources.
- Grading and assessment — In 1990, an intelligent essay assessor (IEA) was developed to evaluate the quality of essays written by students and provide feedback on their writing skills. Over the years, AI has been used in grading/marketing and assessment, such as scoring objective questions, multiple-choice tests, essay evaluation and others. FeedbackFruits uses AI technology to facilitate automated feedback on students' work, enabling them to incorporate the feedback and resubmit their assignments for final assessment (FeedbackFruits, n.d.).
- Creating assessment — It provides an innovative and flexible approach to generating assessments, offering real-time formative feedback. This process involves developing open-ended question prompts that align with the learning outcomes, reducing the workload and time required for teachers to prepare quizzes and tests. Additionally, ChatGPT can assist in brainstorming ideas for research projects, facilitating idea development and gathering.
- Virtual personal tutoring — This offers students round-the-clock feedback and support for tasks, including mathematics problem-solving. However, clear guidelines from educational institutions are necessary to ensure students are well-informed about efficient and responsible utilisation of these resources.
- Enhanced pedagogical practice — This assists educators to design interactive classroom activities and develop comprehensive lesson plans, presentations and teaching materials.

Moreover, these tools can also be used to write academic articles and journals. However, the accuracy of information put together by these tools is questionable (OpenAI, 2023). For instance, Wikipedia is not usually an accepted source of information for academic writing. Which means the data gathered from Wikipedia may not be accurate. In the future, a feature to select the source of information might be made available, which could make the information more accurate.

In some instances, the information generated by ChatGPT may exhibit factual errors. While ChatGPT is designed to provide accurate and relevant information, it is not infallible and may generate inaccurate responses (Qadir, 2022; Baidoo-Anu & Owusu Ansah, 2023; Gordijn & ten Have, 2023; van Dis et al., 2023). It is crucial to exercise critical thinking and verify the information obtained from ChatGPT with reliable sources. Users should be cautious when relying solely on ChatGPT-generated content, as fact-checking and independent verification remain essential practices to ensure the accuracy and reliability of the information obtained.

The issue of academic integrity arises when students engage in the unethical use of ChatGPT during assessments such as relying on it to plagiarise, presenting the generated content as one's own work, or seeking answers without genuine effort and

thus potentially violating the established standards of academic integrity.

Students may use this tool as a means to create their work or assignments entirely without using their analytical thinking and decision-making skills. This may affect their original thinking and analytical skills over time since we all experience difficulties memorising telephone numbers and performing mind calculations since the introduction of mobile phones.

Using AI to automate school administrative tasks can significantly improve efficiency and effectiveness by allowing educators and administrators to focus on the core mission of education and providing students with a more seamless and efficient learning experience. However, automation is not a substitute for human judgment and expertise; it should only be used to supplement and assist.

A group of researchers in Chicago analysed ChatGPT by asking it to write 50 medical-research abstracts based on a selection published in *The New England Journal of Medicine*, the *British Medical Journal* (BMJ), *The Lancet* and *Nature Medicine*. These AI-generated abstracts were then compared with the original abstracts by running them through plagiarism detectors and an AI-output detector. They also asked a group of medical researchers to identify the fabricated piece of work (Gao et al., 2022). The results were

- 100% clearance from the plagiarism detector since it is a newly generated text;
- 44% passed through the AI output detector (machine learning application that detects AI-generated text based on uses of phrases or writing style); and
- The medical researchers identified 68% of fabricated content, but incorrectly identified 14% of the original abstracts as being generated (Manual originality check).

There are clear advantages for idea generation and data identification, however, the application is weaker in literature synthesis and developing appropriate testing frameworks (Dowling & Lucey, 2023). On the other hand, ChatGPT writes believable scientific abstracts and the boundaries of ethical and acceptable use of large language models to help scientific writing remain to be determined (Gao et al., 2022). Aravind Narayanan, a computer scientist from Princeton University, says that you cannot say something is wrong unless you actually know it. It is unlikely that any serious scientist will use ChatGPT to generate abstracts, whether these can be detected as "irrelevant" or not (Technology For You, 2022). The benefits of using ChatGPT are negligible, while the disadvantages are significant.

When posed the question "How would you suggest that students are prevented from using ChatGPT from cheating [sic] in online university exams?", ChatGPT gave the response shown in Figure 1.



Something to think about

ChatGPT could be a "game changer" in existing sorts of assignments and assessments such as essay writing (Stokel-Walker, 2022). This could lead to the return of invigilated or oral assessment forms. Academic misconduct, such as plagiarism and cheating, concerns higher education institutions and educators in the classroom and online assessments (Barber et al., 2021). The companies developing plagiarism-detection software claim to be releasing applications with advanced techniques that could detect AI-generated text, but are they foolproof solutions?



How would you suggest that students are prevented from using ChatGPT from cheating in online university exams?



There are several ways to prevent students from using ChatGPT or other language models to cheat on online university exams:  

1. Proctoring software: Use proctoring software to monitor students during the exam. This can detect and flag suspicious behavior such as switching windows or opening new tabs.
2. Closed-book exams: Design exams that require students to demonstrate their understanding of the material rather than simply recalling information. This can be done through open-ended questions or problem-solving exercises.
3. Randomized questions: Use randomized questions to ensure that students cannot share answers with each other.
4. Time limits: Implement strict time limits on exams to reduce the likelihood that students will be able to consult external resources.
5. Monitor student behavior: Monitor student behavior during the exam to identify cheating, such as plagiarism and sharing answers.
6. Use plagiarism detection tools: Use plagiarism detection tools to identify similarities between student answers and external sources such as GPT-3.

It's important to note that none of these measures are foolproof, but they can make cheating more difficult and reduce the incentive to do so.

FIGURE 1. ChatGPT's suggestions for preventing university students from cheating using the app in online examinations.

Turnitin, one of the leading plagiarism-detection software companies has launched its latest version, Turnitin Feedback Studio, with AI writing detection capabilities. As AI and GPT evolve, the new AI writing tools claim their capability to go undetected. However, the statistical patterns exhibited by these tools remain 'detectable' and 'consistently average' thus far (<https://www.turnitin.com/blog/the-launch-of-turnitins-ai-writing-detector-and-the-road-ahead>). Turnitin is constantly working to improve the capability of detection tools to understand the new patterns generated by AI writing tools (Caren, 2023).

Allowing students to use ChatGPT for learning purposes is not recommended, since it will block their original thinking and stop their urge to be creative. Given the challenge of unlearning acquired habits or practices, it becomes incumbent upon educational institutions to assume the responsibility of training students in the ethical and responsible usage of AI. Internationally, universities have started implementing traditional assessment methods using pen and paper to counter academic misconduct through ChatGPT (Cassidy, 2023).

It is time for us to pause and review the impact of ChatGPT on the actual progress of the students and the quality of assessment. Recently, reviewing a decade's research on

misbehaviour in digital exams, it is evident that dishonesty in these exams is more rampant than in traditionally invigilated exams (Noorbahani et al., 2022). The research concludes that technology-based security measures do not necessarily reduce cheating in the digital assessment procedure, even though they may impact student attitudes toward integrity. ChatGPT may drive changes to educational learning goals, learning activities and assessment and evaluation practices (Zhai, 2022). Hence, we should ask ourselves the following questions:

- Do students and educators receive training to assess the accuracy of information generated by GPT?;
- What strategies or measures are educational institutes implementing to mitigate the risk of students acquiring inaccurate information?;
- Does using ChatGPT in the learning phase kill the students' creative thinking ability and defeat the purpose of design-based education?;
- To what extent can plagiarism and AI output-detecting software limit students from using these technologies to cheat in the assessment process?;
- How feasible is it for the school to upgrade its technology to safeguard the quality of education and assessment?;

Conclusion and recommendations

One of ChatGPT's most impressive features is its ability to reason critically and express thoughts and ideas in flawless prose, seemingly matching human capabilities. Human beings are critical thinkers if they regularly learn and critique their thinking to improve it (Paul, 2005). ChatGPT has a strong possibility of being beneficial for students, educators and researchers. However, it is imperative to note that such technological advancement is not without its shortcomings, which include the risk of academic integrity, biased evaluation among students, factual inaccuracies and over-reliance on AI that can result in limited development of important life skills.

There is a huge risk that the students will use ChatGPT to cheat on assessments, as this technology is capable of generating responses that are largely indistinguishable from those of humans. The results of the experimental study of ChatGPT raises questions about the validity and reliability of online assessments and potential misconduct (Susnjak, 2022). Thus, educators must revise the assessment standards to prevent unfair learning evaluations. Additionally, the new assessments should demand that students use their analytical, critical, communicative and problem-solving abilities by designing engaging activities which require students to debate, discuss in groups, conduct presentations and work as a team (Cotton et al., 2023). The educational institutions also need to provide training on how to use AI writing tools productively while maintaining accountability and ethics to uphold academic integrity.

This article recommends providing teacher training on how to effectively integrate ChatGPT in the classroom and design new assessment processes, including how to recognise and address potential biases. Schools must also invest in advanced plagiarism prevention applications that have inbuilt AI output-detection technology to minimise the risk of academic misconduct. This will also create a sense of gatekeeping to stop students' unethical use of ChatGPT. Furthermore, the educational facilities should develop policies and procedures to guarantee the inclusive, equitable, transparent and ethical use of ChatGPT, including considerations of data privacy. It is highly recommended to invest in research to further understand the impact of ChatGPT on students' learning and the potential long-term effects on the education system.

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