

AI in Education - Evaluating ChatGPT as a Virtual Teaching Assistant

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Abstract

“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.” Marie Curie

This research paper presents a comprehensive review of recent literature to examine the positive and negative aspects, as well as the limitations, of utilizing ChatGPT in academic contexts. The study includes conversational interactions with ChatGPT to evaluate its responses and gain insights into its impact on academia. The review highlights advantages such as enhanced information search and content creation, while also addressing ethical considerations like privacy and bias. Overall, ChatGPT shows significant potential to revolutionize academia, but responsible and ethical implementation is crucial. This study contributes to a deeper understanding of ChatGPT's capabilities and limitations in academic settings.

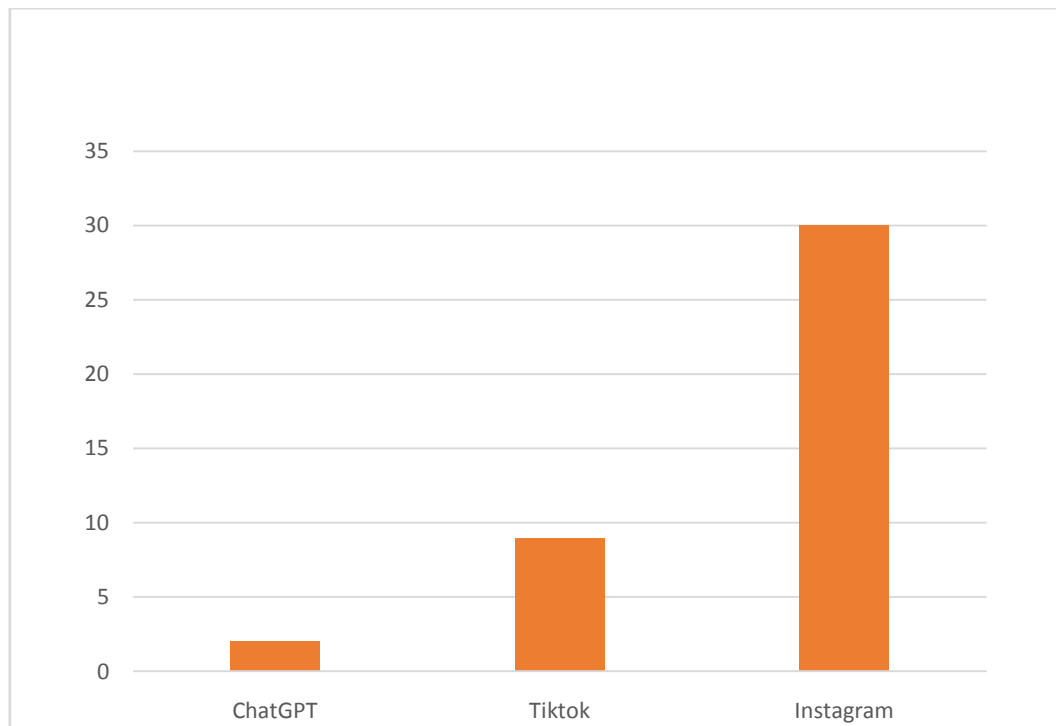
Keywords: ChatGPT, Academic contexts, Positive and Negative aspects

1.Introduction

According to Oxford University, household tasks will be automated through AI by 2033, leading to a potential 39% reduction in time spent on such activities. Furthermore, it is anticipated that by 2025, 95% of users will interact with AI (Hindustan, July 9, 2023). One remarkable example of AI's transformative power is ChatGPT, considered the most advanced chatbot to date. ChatGPT, a Generative Pre-Trained Transformer (GPT) language model developed by OpenAI, can generate human-like responses and text (Dale, 2021).

A global survey predicts that ChatGPT will soon surpass Google and other search engines in providing more relevant results. Within just two months of its launch, ChatGPT had acquired staggering 100 million users, as reported by Hindustan (February 4, 2023). Industry analysts from USB forecast a rapid increase in user count in the foreseeable future. To put it into perspective, it took Tiktok nine months and Instagram 2.5 years to reach 100 million global users. Sensor Tower indicates that the viral launch of ChatGPT positions OpenAI ahead of other AI companies. Initially introduced on February 2, ChatGPT offered a \$20 monthly subscription exclusively in the United States (Hindustan, February 4, 2023).

.Figure 1: Time taken to reach 100 million users (in month)



However, recent reports from Similar Web, an analytics firm, indicate a decline in ChatGPT's traffic on both mobile and web platforms in June. Global website visits to ChatGPT decreased by 9.7% during that month. Despite this, ChatGPT's impact on language understanding and its potential to revolutionize various aspects of human life remain noteworthy.

As with any technological advancement, ChatGPT brings both excitement and concerns. Addressing potential biases, ethical considerations, and enhancing user experience will be crucial for the responsible and beneficial implementation of ChatGPT in different domains

OpenAI launched the iOS version of ChatGPT in May, and it was downloaded 17 million times worldwide. According to Similar Web, ChatGPT's website still attracts more visitors compared to Bing.com, Microsoft's search engine. OpenAI's AI chatbot receives 1.5 million monthly visitors, placing it among the top 20 websites worldwide (Hindustan Live, 10 July 2023)

There are some important concepts related to ChatGPT

1. Chatbot: A chatbot is software that is designed to enable interaction between a human user and a computer or any other system in a natural language like a human being does (K Shingte, S. 2021).
2. GPT: GPT stands for Generative Pre-Trained Transformer. It is a learning machine that generates and understands human language (Radford et al., 2018).
3. Pre-trained Transformer: A pre-trained Transformer serves as a language processing model that can be fine-tuned for generating texts, answering questions, etc. (H, Chen. 2021).
4. Language Processing: The language processing process is utilized by ChatGPT to provide answers and engage in conversation with users. (Manning & Schutze, 1999)
5. Training Data: Training data refers to the collection of materials used to train a model. ChatGPT also relies on training data to provide appropriate and fluent responses.

2. Research Questions of the study

RQ1. What positive aspects does ChatGPT possess?

RQ2.What are some potential negative aspects of ChatGPT?

RQ 3. What are the limitations and potential consequences associated with using ChatGPT?

3.Approach

The researcher will conduct a comprehensive review of articles to assess the positive and negative aspects, as well as the limitations, of utilizing ChatGPT. Additionally, through a conversation with ChatGPT, the researcher aims to confirm and clarify statements made in the literature and explore the consequences of using this technology. This approach allows for a deeper understanding of the benefits and challenges associated with ChatGPT, including ethical considerations, while providing valuable insights for future research and responsible implementation in various domains.

4. Review of Related Literature

This systematic review of literature explores the capabilities and limitations of ChatGPT in the field of education. ChatGPT is recognized for its impressive performance in generating responses on various subjects, but it has limitations such as a lack of common sense knowledge, potential bias, and challenges with complex reasoning (Mostafizer Md, 2023). Educators are encouraged to embrace ChatGPT as a tool to enhance students' writing skills and foster creativity, while considering the need for training on ethical usage. ChatGPT offers benefits such as facilitating learning assessment, enhancing pedagogical practices, providing virtual personal tutoring, creating outlines, and stimulating idea generation (Sok, 2023). As large language models progress, there is a need to understand their performance in diverse verbal test scenarios (de Winter, 2023). The integration of generative AI tools into classrooms and the consideration of ethical implications are crucial. Academic integrity and plagiarism concerns arise with ChatGPT's potential to generate content, while defining the standards of personhood in academic writing becomes essential (Ventayen, 2023). While ChatGPT holds promise in advancing academia, its limitations include perpetuating biases, lacking contextual understanding, and being computationally expensive (Dale, 2017; Lucy & Bamman, 2021; Strubell et al., 2019; Zhou et al., 2021). The impact of large language models like GPT-3 on scholarly publishing is examined, emphasizing the need for responsible usage (Brady, 2023). The review concludes by highlighting the potential for ChatGPT in compiling scholarly articles, but also raising concerns about academic honesty and the importance of an ethical approach to AI tool usage in higher education (Dorskaliuk B, 2023; Debby R, 2023).

5.RQ1.What positive aspects does ChatGPT possess?

ChatGPT has been incredibly successful since its launch in November 2022, as it can generate essays, stories, and even job application cover letters (Abid, 2022). After conducting a comprehensive review of the existing literature, the researcher identified multiple positive aspects of ChatGPT within the field of education. According to former director Prof. Dr Ram Gopal Das from IIT Delhi, every new technology brings a revolutionary change to the education sector. Just like industrial revolutions, technological advancements continue to establish impressive benchmarks in the field of education (Mansi, M., 2023)

a. Academic Work

ChatGPT is an advanced chatbot capable of fulfilling various text-based requests, such as generating thank-you letters and assisting with complex work-related issues (Liu et al., 2021). It has found applications in fields like literary language, customer service, and content development (Dinesh, K. et al., 2023). ChatGPT can boost students' creativity, provide personalized tutoring, and enhance their

preparation for AI systems in the future. It meets students' learning needs, leading to improved efficiency and grades (Hao Yu, 2023).

b. Impact on Research

Researchers have explored ChatGPT's potential applications in academic work, cybersecurity, customer support, software development, employment, and information technology. It has also been considered for use by researchers and scholars. Artificial intelligence, machine learning, and natural language processing are rapidly advancing fields with broad impacts across institutions (Wamba et al., 2021).

c. Revolutionizing Education

ChatGPT is cautiously entering the education sector, where it holds the potential to revolutionize student learning and interactive education. Technological advancements have historically brought revolutionary changes to education, establishing impressive benchmarks (Mansi, M., 2023). While concerns exist about potential limitations on students' creative perspectives,

d. Enhancing Cybersecurity

ChatGPT has demonstrated significant impact in the field of cybersecurity. It plays a vital role in detecting and preventing cyberattacks by analyzing language in emails to identify phishing attempts and distinguish between genuine and fake messages. It also aids in identifying malware by analyzing code language and contributes to creating secure passwords (Mansi, M., 2023). ChatGPT is making progress in education by providing benefits for academic work, changing how students learn, and helping with cybersecurity efforts to keep information safe.

6.RQ2.What are some potential negative aspects of ChatGPT?

After closely studying the existing literature, the researcher discovered some drawbacks and potential downsides of using ChatGPT, the language model created by OpenAI, in the field of education.

a. Manipulation and Lack of Understanding - ChatGPT lacks its own understanding and operates based on algorithms fed by humans, potentially allowing for the manipulation of emotions and presenting information without proper sourcing or links in its responses.

b. Complexity and Limitations - ChatGPT's answers can sometimes be complex, and its knowledge is limited to information up until the end of 2021, without updates for subsequent years.

c. Job Displacement and Lack of Creativity - Predictions suggest that the future may bring job reductions and increased self-employment opportunities, but it also raises concerns about the potential lack of creativity in AI-driven jobs. The reduction of jobs requiring human involvement may lead to new job opportunities, but it is true that ChatGPT itself lacks human-like creativity.

d. Scandals and Cheating - Instances of cheating using ChatGPT have been reported, such as civil service aspirants transmitting leaked answers via Bluetooth devices and students cheating in exams. Educators and institutions need to be aware that ChatGPT could be used for cheating. They should take actions to prevent this and maintain fairness in online exams for all students (Susnjak, 2022). The availability of instant solutions inhibits critical thinking and reasoning skills among students.

e. Academic Integrity Concerns - Institutes have banned the use of ChatGPT in assignments to encourage independent thinking and brainstorming. Investigations have revealed instances of students completing assignments using ChatGPT, compromising academic integrity.

f. Accelerated Research Process - ChatGPT's ability to generate complete research papers quickly raises concerns about the potential misuse of AI tools, such as generating papers from data sets or developing concepts without genuine human input.

g. Ethical and Emotional Manipulation - AI's advancement and potential ability to manipulate emotions raise ethical concerns. On May 11, 1997, Deep Blue's victory over Garry Kasparov marked a significant moment in chess history. If we imagine an AI capable of surpassing the world's best players by studying chess rules, it raises intriguing questions about the potential impact of advanced AI systems possessing comprehensive knowledge of human civilization's sequential development, aligning with ideas explored in Yuval Noah Harari's book "Sapiens." Films like "Her" exemplify the potential emotional influence of AI, hinting at a future where AI could play with human emotions. The ongoing debate surrounding the inclusion of AI-enabled tools like ChatGPT in academia is expected to persist for an extended period (Shiri, 2023).

7.RQ 3. What are the limitations and potential consequences associated with using ChatGPT?

After thoroughly reviewing the literature, the researcher found limitations and potential negative outcomes of using ChatGPT in education.

The limitations of ChatGPT

a. Limited Knowledge and Potential Inaccuracy - ChatGPT's information can be incorrect or biased, requiring users to critically evaluate the received information and not blindly accept everything the chatbot says.

b. End of Human Writing and Lack of Imagination - ChatGPT's emergence as a writer signifies changes in human writing practices, but it lacks imaginative capabilities. Despite accumulating vast amounts of data, AI remains machine-based and cannot imagine like humans.

c. Limited Data Availability and Need for Updates - The latest version of ChatGPT is based on information collected until the end of 2021, lacking information for the years 2022-23. Digital experts must enhance the available data and information for chatbots.

d. Varied Performance and Lack of Full Trust - While ChatGPT has shown success in passing tough exams like law and medicine, it faced failure in the JEE Advanced exam in India. OpenAI's CEO has also expressed a lack of full trust in the answers generated by ChatGPT. (India Times, 2023; Statement to Aaj Tak)

The limitations of ChatGPT lie in limited knowledge with potential inaccuracies, the absence of human-like imagination, limited data availability, and variations in performance that lead to questions about full trust in its responses. Users should critically evaluate information and consider its limitations when interacting with ChatGPT.

8. Conversation with ChatGPT

This section presents a series of questions posed by a researcher (human) to converse with ChatGPT. The responses provided by ChatGPT are credited to the Chat GPT tool. Researchers' opinion after reviewed various research papers, newspaper articles, websites is analysed with ChatGPT responses.

The researcher is including screenshots of each question asked by her, along with the corresponding responses from ChatGPT. The questions are labelled with "Q" to indicate the question and "A" to denote ChatGPT's response.

Q1. How does ChatGPT enhance student engagement and active learning in academics?

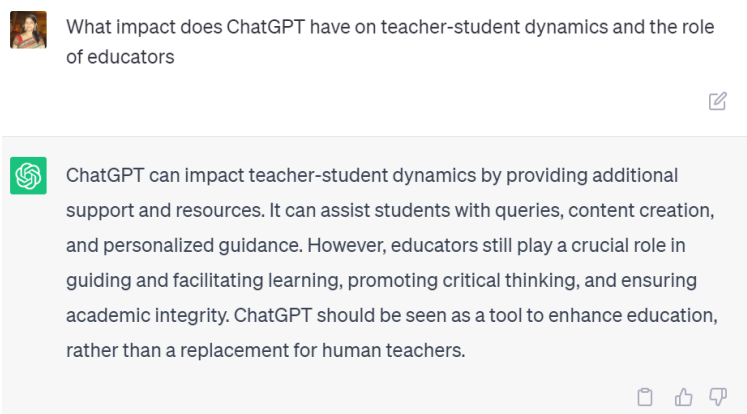
A1: ChatGPT enhances student engagement and active learning in academics through interactive conversations, personalized assistance, 24/7 availability, support for exploratory research, facilitation of

collaborative projects, assistance with content creation, and integration with gamification and quizzes. These features promote student participation, individualized learning, deeper understanding, and active exploration of course materials.



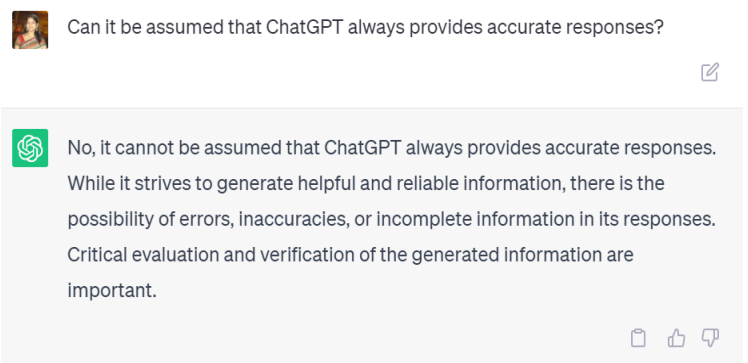
Q2. What impact does ChatGPT have on teacher-student dynamics and the role of educators?

A2: ChatGPT can impact teacher-student dynamics by providing additional support and resources. It can assist students with queries, content creation, and personalized guidance. However, educators still play a crucial role in guiding and facilitating learning, promoting critical thinking, and ensuring academic integrity. ChatGPT should be seen as a tool to enhance education, rather than a replacement for human teachers.



Q3. Can it be assumed that ChatGPT always provides accurate responses?

A 3: No, it cannot be assumed that ChatGPT always provides accurate responses. While it strives to generate helpful and reliable information, there is the possibility of errors, inaccuracies, or incomplete information in its responses. Critical evaluation and verification of the generated information are important.



Q4. What ethical considerations should be addressed when using ChatGPT in education?

A 4: Ethical considerations when using ChatGPT in education include privacy protection, addressing biases, transparency about AI nature, promoting academic integrity, empowering critical thinking, responsible deployment, and continuous evaluation of impact and ethical concerns



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Q5. What challenges arise when using ChatGPT for student assessment and evaluation?

A 5: When using ChatGPT for student assessment and evaluation, challenges may arise. These include difficulties in ensuring the authenticity of student work, the potential for plagiarism or external assistance, and the need for reliable and objective grading criteria. Maintaining academic integrity, preventing gaming of the system, and fair evaluation methods are crucial considerations in using ChatGPT for student assessment.



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Q 6. To what extent does the use of ChatGPT in educational settings contribute to an increased tendency for cheating among students?

A 6: The extent to which the use of ChatGPT contribute to an increased tendency for cheating among students in educational settings depends on various factors. While ChatGPT can provide access to information, it is important to implement measures to discourage misuse and promote integrity. Clear guidelines, proper monitoring, and fair evaluation methods can help mitigate the risk of cheating tendencies



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Q7. Does the use of ChatGPT negatively impact students' retention abilities?

A7: The impact of ChatGPT on students' retention abilities can vary and is influenced by several factors. While the use of ChatGPT as a tool alone may not inherently lead to negative impacts on retention, overreliance on AI systems without active engagement and reinforcement of learned concepts could potentially affect long-term retention. Proper integration with effective learning strategies and active student participation are crucial in mitigating any negative impact on retention.



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Q8. What precautions should be taken when utilizing ChatGPT in the field of education?

A8. When utilizing ChatGPT in education, it's important to have supervision to monitor and intervene if necessary. Additionally, ensure data privacy and implement content filtering to prevent inappropriate information. Verify the accuracy of responses and promote responsible use by encouraging students to seek human guidance when needed.



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After conversing with ChatGPT, it acknowledges the findings of our literature review and agrees with the observations presented in our review.

9. Conclusion

In conclusion, our conversation with ChatGPT confirms and aligns with the findings of our literature review. The alignment between ChatGPT and the observations presented in our review further strengthens the validity and reliability of our research. While ChatGPT presents numerous advantages, it is crucial to address the ethical concerns surrounding its usage. These concerns primarily revolve around the potential for manipulation, limited understanding, job displacement, cheating incidents, and the misuse of AI in research. The ability of ChatGPT to generate human-like responses raises questions about the authenticity and transparency of the information it provides. The reliance on algorithms without human emotions or contextual understanding can lead to biased or incorrect outputs. Furthermore, the rise of AI technologies like ChatGPT has the potential to disrupt job markets, resulting in unemployment and socioeconomic challenges. Ethical issues also arise from the misuse of ChatGPT for cheating in exams or the creation of fake research papers. Therefore, it is essential to carefully consider and address these ethical concerns to ensure responsible and ethical use of AI technologies like ChatGPT in various domains.

At last, I expressed my gratitude to ChatGPT for answering my questions and noticed its response, where it stated that it is here to assist us.



Thank you so much for patiently giving answers to my questions.



You're welcome! I'm glad I could assist you with your questions. If you have any more inquiries in the future, feel free to ask. Have a great day!



ChatGPT acknowledged its ability to assist but advised against complete dependence. It encourages users to exercise their own judgment and not solely rely on its responses. ChatGPT serves as a tool, reminding us of the importance of human involvement and critical thinking in decision-making.

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Please note that some references may be missing or duplicated, and any typographical errors in the original references have been reproduced as-is.

Below are the sites of various educational portals researcher reviewed recently. Some of them contain the latest articles, as ChatGPT is currently in the spotlight.

1. <https://www.nytimes.com/2022/12/21/technology/personaltech/how-to-use-chatgpt-ethically.html>
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4. <http://www.livehindustan.com/gadgets/story-chatgpt-traffic-and-downloads-decline-for-the-first-time-since-launch-8419686.html>
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6. <https://www.livemint.com/technology/tech-news/openai-keen-on-supporting-startups-education-in-india-11686243449285.html>
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14. <https://www.livehindustan.com/gadgets/story-chatgpt-traffic-and-downloads-decline-for-the-first-time-since-launch-8419686.html>
15. <https://www.amarujala.com/technology/tech-diary/over-400-students-found-cheating-in-exam-with-chatgpt-university-starts-investigation-2023-07-07>