

IMPACT OF CHATGPT ON EDUCATION: CHALLENGES AND OPPORTUNITIES

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Abstract: Artificial intelligence (AI) is one of this century's leading and influential innovation techniques. In various instances, it impacted every field, such as healthcare, banking, automobile, retail education, the food industry, and many others. Nowadays, AI has become one of the biggest challenges facing our world related to the quality of service delivered, the future of many jobs, the appropriate use of technology, and much more. Education is one of the most affected fields where the impact of AI leads to positive and sometimes negative outcomes. The broad consensus is that effective pedagogy leads to high-quality educational outcomes. Therefore, AI-powered tools and techniques automate tasks, personalize the learning process, and deliver real-time feedback. Chatbots like ChatGPT are one of the beneficial ways to use artificial intelligence in education. Large language model ChatGPT can create text, translate language, write creative texts, and provide helpful answers to questions. It can radically change how students interact with their teachers and the way they learn. This paper explores the impact of ChatGPT on education and discusses how it may automate administrative activities, deliver real-time feedback, and personalize learning. The challenges and opportunities of employing AI in education are covered, and a list of recommendations is provided to ensure that ChatGPT is well used without harming the quality of education.

Keywords: Artificial Intelligence, ChatGPT, Quality of Education, Challenges, Opportunities.

INTRODUCTION

Artificial intelligence (AI) is a terminology with different meanings based on each one's perspective. As Nick Bostrom, a leading expert from Oxford University, explains: "A lot of cutting-edge AI has filtered into general applications, often without being called AI because once something becomes useful enough and common enough, it is not labeled AI anymore" [1]. Based on the previous definition of AI and because AI is a contribution from various parties, it can be defined as a computer system that can interact through multiple technologies, such as visual perception and speech recognition, in an intelligent behavior [2]. Plenty of AI applications around us have become part of our daily lives, and the education sector is extensively affected by these applications, such as ChatGPT, Bard, and much more. AI-powered tools and technologies are being applied to automate obligations, customize studying,

and provide real-time feedback. ChatGPT is considered one of the most significant language models able to write a variety of creative material, translate languages, and offer intelligent answers to any subject matter. This research focuses on reviewing the impact of the AI tool ChatGPT on the outcomes of education systems, the challenges that educators face to deliver the knowledge and guarantee the quality of teaching they provide, and finally, to provide a list of recommendations for better future educational environments. The primary goal of this study is to summarize and highlight the main issues of AI tools in reference to the education quality. Hence, the next step is to deploy and try new innovative examination methods that will guarantee the quality of education level regardless of the dependency of students on the integrated AI tools such as ChatGPT.

This paper is divided into seven sections. Section 2 is dedicated to a literature review on the impact of AI in education. Section 3 presents the impact of AI on education and the implications of ChatGPT. Opportunities associated with the use of AI in education are listed in Section 4. The challenges associated with using AI in education are discussed in Section 5. A list of recommendations is provided in Section 6 to ensure that ChatGPT will not negatively impact the quality of education. Finally, Section 7 is assigned for the conclusion and potential future work.

LITERATURE REVIEW

The impact of ChatGPT on education has been extensively studied recently, and many methods have been implemented to review the advantages and disadvantages. The research paper's authors [7] have followed the recommendations of the PRISMA Statement [8]. The PRISMA statement, which stands for The Preferred Reporting Items for Systematic Reviews and Meta-Analyses, was released originally in 2009. Its idea was to assist systematic reviewers in transparently reporting the review's motivation, the authors' methods, and their findings. However, the statement has been updated and modified in 2020 by the paper's authors [8]. The update was necessary due to developments in systematic review terminology and methodology over the years between 2009 and 2020. One hundred fifty-four educational records were investigated from databases such as Web of Science, Scopus, and Google Scholar between May and June 2023.

After filtering these articles, 12 studies were analyzed, and the authors concluded that OpenAI's innovative creation, ChatGPT, is developing how educators and students achieve the learning process in the classroom. Deploying ChatGPT in schools brings many benefits and challenges that educational agents need to be aware of to improve the quality of education in the classroom. Its adoption is considered a promising tool offering multiple benefits for learning. This tool allows content and activities to be customized to specific needs, easy to use, and accessible for both instructors and students. ChatGPT can direct teachers to focus on the most important ideas and solutions. However, the authors recommended that all teachers need to be trained to use and apply ChatGPT features wisely. Hence, they can be aware of its limitations and address the associated ethical and pedagogical challenges [9]. ChatGPT shows excellent support in education methods and learning techniques but suffers from some challenges, such as how to use it efficiently and the quick response to any question, which might not be ethical in some situations, in addition to the impact on the quality of learning outcomes [7].

Another study that discussed several aspects of using ChatGPT in education was a SWOT analysis of ChatGPT prepared by Benzaghta et al. SWOT stands for strengths, weaknesses, opportunities, and threats, initially introduced in the early 1950s as a framework to detect organizational strategies. Analyzing the methods and strategies based on SWOT analysis gives a clear idea of the future of this organization toward success and failure [10]. Similarly, using ChatGPT in education as a modern technology and strategy has been analyzed through a SWOT analysis by Malinka et al. This study shows the advantages of ChatGPT in education based on the strengths and opportunities of this technology, and the disadvantages are concluded from the weaknesses and threats that might appear by deploying it. They investigated the impact of ChatGPT technique in education in reference to university level students. The main structure of their study is to perform a detailed analysis of ChatGPT's features and abilities to solve questions in different disciplines, such as computer security specialization at the IT-oriented university. The positive and negative feedback and impact on the university level after using ChatGPT are discussed. The authors also discussed the properties of AI and how it can produce new education methods, considering many limitations that might face these methods, such as adaptation, detection, and prevention for instructors and students. They demonstrated the

misuse of ChatGPT by providing students with effortless ways to earn high grades and pass their courses at the university when considering ChatGPT services. However, the negative impact of ChatGPT on students can be eliminated by focusing on IT security and implementing modules that can validate the students' knowledge even if they are using ChatGPT continuously [11]. Hence, the positive impact will be increased by finding ways to prepare students for the effective use of this technology, such as critical thinking, the ability to work without technology, or creativity.

In conclusion, ChatGPT and AI tools have many benefits for students and educators, and the most important benefit is the acceleration of the learning process. Moreover, Farrokhnia et al. addressed all the aspects of ChatGPT based on SWOT analysis by providing a clear structure to gather information from multiple sources to highlight all threats, weaknesses, opportunities, and strengths. Figure 1 depicts the results of deploying ChatGPT in education. As a result, the authors concluded that, as with any modern technology and strategy, ChatGPT can achieve its educational goals by improving teaching methods and increasing the resources' reachability and accessibility. However, it should be wisely deployed while considering the awareness of its impact on students from different perspectives, such as decreasing the learning outcomes and the quality of education if students do not make efforts or pay attention to understanding and discussing the provided information and knowledge [6].

Another usage of ChatGPT is tested in the research paper [12] to prove the reliability of ChatGPT in fixing programming bugs for computer codes. The authors of this study presented the features of AI tools in software development and suggested AI tools for debugging codes. They built their observations on previous studies, such as papers [13] and [14] that provide the characteristics of ChatGPT in finding and fixing bugs for computer codes. The observed capabilities are listed below:

- **Natural Language Processing (NLP) Capabilities:** ChatGPT is a powerful tool for understanding and analyzing human-like text like NLP. Moreover, it allows the model to detect the idea behind the code and recognize the significant bugs based on the language used.
- **Knowledge Representation:** ChatGPT depends on continuous learning techniques that use massive amounts of text data, including information about software development and programming languages. Hence, it provides excellent practical knowledge in detecting and fixing code errors and bugs.
- **Pattern Recognition:** It is common in computer codes to have patterns associated with specific types of bugs. ChatGPT can detect such patterns in text data, which will help to figure out the code bugs quickly.
- **Error Correction:** As mentioned in the previous point, ChatGPT is based on a continuous training model that uses vast text data with diverse types of errors. The feature of the continuous learning method provides ChatGPT with error detection and correction ability.
- **Generalization:** ChatGPT can generalize from its training data to new unseen examples. This can be useful in debugging code, as it allows the model to identify bugs in new code based on its prior knowledge.

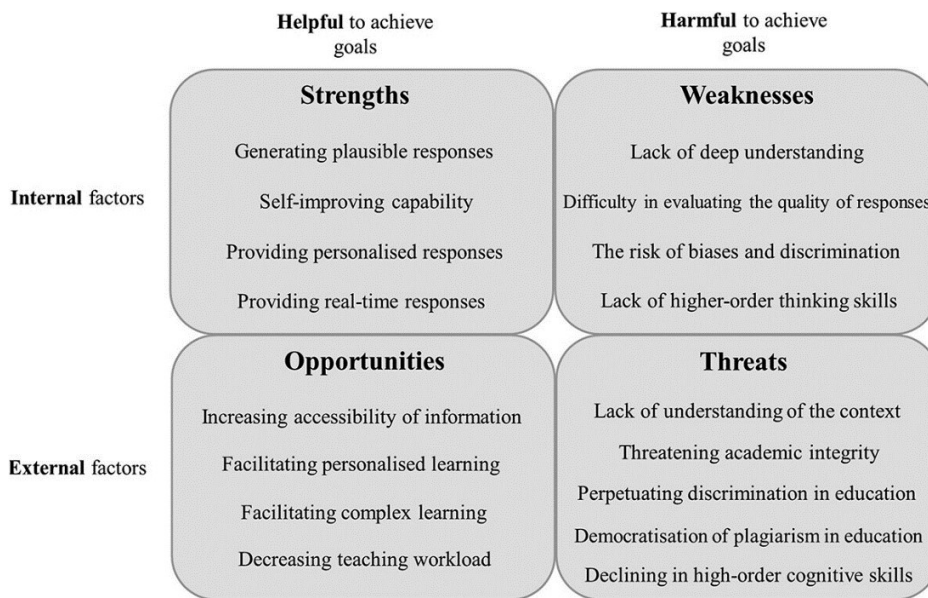


Figure 1. SWOT analysis of using ChatGPT in education [6].

IMPACT OF AI ON EDUCATION

While ChatGPT and AI tools offer incredible potential tools to support traditional learning, they are separate from the learning experience provided by humans. A blended approach, where AI complements traditional learning, is the ultimate solution for the educational system to benefit from. Figure 2 summarizes the advantages and disadvantages of integrating ChatGPT with education based on the results we concluded from various similar works from different databases.

The effects of AI on education can be translated as follows:

- 1. Learning reachability:** AI and its different tools can improve learning reachability by providing students with specialized education and remarks. Students can study at their velocity by concentrating on the regions wherein they need the maximum help.
- 2. Fast Feedback and Response:** The intelligent and powerful mechanism of AI tools allows students to explore real-time feedback and get immediate remarks on their work, so they can improve their responses by having the ability to solve problems and detect errors.
- 3. Reducing human administrative work:** Administrative tasks, like grading assignments, booking appointments, sending emails, and many more, can be automated using AI. By doing so, instructors may have extra time to improve their coaching techniques and build a solid court with students.

ChatGPT is known as the most robust and effective language manipulation tool. Another advanced tool is Chatbot, which is an advanced method of OpenAI. AI's various modules and elements can convert teaching and learning in multiple manners. ChatGPT is one of these elements, providing a significant shift and many educational advantages. Some of these advantages are but not limited to:

- **Improvement of Language Skills:** ChatGPT has proven to be a powerful technique to improve student's writing skills, who can interact with the system to prepare professional texts without errors. Moreover, students can have fast responses and feedback about their text with correct suggestions to improve their writing [3].
- **Development of Teaching Methods:** ChatGPT can convert teaching methods from the traditional way to entirely new interactive methods in various techniques, such as learning through interactive activities, role-

playing video games, simulations, and discussions. Hence, students can learn in a fun and engaging environment.

- **Feedback and support:** ChatGPT can guide students when solving complex problems and provide rapid feedback for better assistance. Students' knowledge and skills can be enhanced here.
- **Ease of Use:** Delivering knowledge should not be limited to only regular students and educators. At the same time, it should be expanded to all interested individuals willing to share information, including people with disabilities. ChatGPT can offer accessibility to information in different contexts to match the various needs for gaining knowledge.

As an example of the power of using ChatGPT in education from teachers' and students' perspectives, the following can be summarized:

- Teachers can create lesson plans, activities, and assessments specific to their students' requirements.
- Develop customized learning modules for students with difficulties or who require further assistance.
- Students can receive immediate feedback on their writing and other tasks.
- Provide interactive simulations and games to teach students complex concepts pleasantly and excitingly.
- Even if a student's native language is a minority language, it can give them access to educational materials in that language.

However, using such powerful technology may raise some challenges and risks. Some of these limitations are listed below:

- Decrease interaction and engagement among students.
- Overreliance on AI by students.
- Passive learning environment.
- Reduce critical thinking and problem-solving skills.
- Reduce creativity and restrict students' freedom to express their own thoughts.
- Provide biased answers.

Advantages	Disadvantages
<ul style="list-style-type: none">• Increasing accessibility of information• Improving teaching methods• Optimizing personalized learning• Reducing human administrative work• Fast Feedback and Response• Learning reachability• Ease of Use• Improving of Language Skills	<ul style="list-style-type: none">• Bias• Data privacy• Job losses for teachers• Lack of creativity• Privacy risks and security

Figure 2. Advantages and disadvantages of ChatGPT

The advantages and disadvantages of using ChatGPT in the education field specifically, are summarized in Figure 2 based on many recent studies and reviews. These facts can help to produce as future work an updated model for examining students in different education levels that have the ability to overcome those disadvantages and limitations. Moreover, creating new methods can be useless if there are no previous surveys that highlight the various aspects of the existing models.

OPPORTUNITIES OF CHATGPT IN EDUCATION

ChatGPT is a powerful tool in AI, and it can open the way to gain plenty of advantages by using this technique, as discussed above. To chase the advantages of ChatGPT, we need to focus and be aware of its strengths and opportunities. According to some extensive research on the opportunities of employing ChatGPT in education, below are some of the most significant opportunities:

1. **Increasing accessibility of information:** Based on a SWOT analysis, it is concluded that ChatGPT can offer students and instructors smooth access to information through various platforms (e.g., a website or a smartphone app) and in various fields. In addition, it is a more powerful tool than traditional search engines as it offers a written-out answer rather than just a list of sources [4].
2. **Improving teaching methods:** For teachers, ChatGPT can assist them in identifying and creating relevant teaching materials. It can also help them to generate lesson plans for teaching with a set of parameters and constraints [5].
3. **Optimizing personalized learning:** ChatGPT has the strength to provide personalized support and feedback to students at various levels of complexity [6].

Moreover, Table 1 presents a comparison between learning with ChatGPT and traditional learning practices.

CHALLENGES OF CHATGPT IN EDUCATION

This section examines the challenges associated with using ChatGPT in education, such as bias, data privacy, job losses for teachers, lack of creativity, security, and privacy risks.

- **Bias:** ChatGPT may also have biases that may result in students being mistreated. To make sure that ChatGPT and AI tools are not biased, it is essential to evaluate them through data validation.
- **Data privacy:** To be trained, AI models often need data. Privacy issues exist because these facts can consist of private and vital student data. When utilizing AI tools, including ChatGPT, it is essential to take the necessary actions to protect student data.
- **Job losses for teachers:** According to some researchers, teachers' jobs could be lost because of AI. This is because several tasks that instructors presently perform, including grading and exam preparation, may be automated using AI tools.
- **Lack of creativity:** Some individuals are concerned that ChatGPT may produce a generation of students who need more originality, creativity, and autonomy. This is because this tool can provide learners with the answers to their queries without requiring them to think critically and independently.
- **Privacy risks and security:** AI and ChatGPT gather much student data. Students' progress may be monitored using this data, but it can also be used for additional purposes like targeted marketing and advertising.

Table 1: Traditional teaching Vs. the use of ChatGPT

	ChatGPT	Traditional Teaching
Accessibility	It can be accessed at any time. All you need is an internet connection.	It is limited to physical presence during the lecture time
Bias	It can be biased due to the trained data	It is limited since teachers are following a specific curriculum
Cost	Minimal cost, ChatGPT monthly	Costly

	registration fees	
Depth of Knowledge	It gives vast knowledge due to the immense trained data in the model	It depends on the teacher's experience and knowledge
Discipline	NA	It can maintain the rules and monitor student's progress
Emotional interaction	It lacks emotional intelligence	Can develop social skills, values, and ethics
Evaluation	NA	Can be done through the exams, quizzes or even orally through Q&A
Individual attention	It cannot provide.	Teachers can motivate students
Interactivity	It engages in back-and-forth interactions due to the commands and queries	It depends on the teaching style
Personalization	It gives personalized learning based on students' needs	It follows a specific curriculum
Real world experience	It offers information based on previous experience and research	Experienced teachers can share their knowledge and real-time experience with students
Teaching strategies	It is limited to questions and answers	It can offer different teaching methods

RECOMMENDATIONS

This section offers recommendations to guarantee that AI and ChatGPT are utilized securely and efficiently without harming students or the quality of education. First, teachers should receive essential training on how to use ChatGPT and AI efficiently. The potential advantages and risks of ChatGPT and the best ways to use them in the classroom should be covered in the training. Additionally, policies and procedures for the usage of ChatGPT and AI should be developed by schools, universities, and governments. These regulations should cover topics like data security and privacy, as well as the role of teachers in implementing those tools in the right way to benefit the educational process. Moreover, the positive and negative impact of AI and ChatGPT on education should be further investigated, studied, and developed by researchers.

CONCLUSION

Although ChatGPT and AI have the potential to transform education, there are a few possible challenges that need to be resolved. Before AI and ChatGPT are widely implemented in the educational system, it is crucial to thoroughly examine their potential advantages and disadvantages. ChatGPT could significantly raise the standard and accessibility of teaching for all students. To use ChatGPT properly and ethically, it is necessary to keep in mind that it is still in development. It is also critical to remember that ChatGPT should not and cannot replace human instructors to maintain the quality of education and ensure the creativity of intellectual outcomes. Although ChatGPT can be a valuable tool for educators, it cannot substitute physical training and engagement. As a future work, experiments are to be conducted to test the impact of deploying ChatGPT on university students.

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