

An Explorative Review of Artificial Intelligence Software (Chatbot) Impact on Education System

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Abstract

Computer programs known as chatbots can mimic conversations with real users. They are utilized more frequently in education to automate administrative activities, respond to student inquiries, and offer tailored learning support. An exploratory overview of the research on chatbot software and its prospective effects on the educational system is presented in this essay. The history of chatbots and how they have evolved in the education industry are covered in the first section of the study. The available chatbot software is then reviewed, along with its capabilities and effects on students and teachers. The requirement for high-quality data and the possibility of bias are some of the difficulties related with employing chatbots in education that are also covered in the paper. The future of chatbots in education is covered in the paper's conclusion. It implies that chatbots could fundamentally alter how we educate people. To completely comprehend how chatbots affect student learning and achievement, more research is necessary, according to the report.

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1. Introduction

The employment of AI in academia is fraught with issues and difficulties. The potential for AI systems to reinforce current prejudices and discrimination in research and education is one of the key worries. There is also a chance that AI systems will be abused or exploited to generate inaccurate or biased results. We saw the creation of a new AI system named ChatGPT at the end of the year 2022. It is regarded as a language-based artificial intelligence system that belongs to a wider group of transformers. Deep neural networks called transformers are created to analyze and produce data

sequences, like text. ^[1] ChatGPT, a chatbot, can produce human-like responses to a variety of inquiries and prompts since it was trained on a large dataset of text from the internet. In recent years, artificial intelligence (AI) and chatbots have advanced quickly and are already pervasive in many industries, including academia. AI systems and chatbots are being viewed as an important tool for researchers and academics due to the growth of large data and the requirement for efficient and quick data processing. Recent research by ^[2] acknowledged that little research has been done on the use of AI in the field of education. Additionally, these researchers hypothesized that there is a steadily rising interest in researching how AI is affecting both research and teaching.

The potential advantages of deploying AI systems and chatbots in the academic setting have been the subject of numerous studies and papers ^{[3][4]}. The improvement of research's accuracy and efficiency is one of the primary advantages. Massive amounts of data can be processed fast by AI systems, which can also spot patterns and connections that might be hard for humans to see. This can result in more effective and efficient research, allowing scientists to concentrate on harder and more original tasks ^[5]. The flexibility to customize learning routes is another advantage of AI systems and chatbots in education ^{[6][7][8][9]}. In order to assist students succeed, AI systems can assess the learning preferences and skills of each student and then offer tailored advice and support. A more fair and inclusive education can be achieved by using AI technologies to facilitate online learning and make education available to students in remote locations ^{[10][11]}. It's also interesting to note that there have only been two studies done so far on the moral dilemmas raised by chatbot use in the educational setting. The first one was carried out ^[12] and used with students in grades K–12. The second study, carried out by ^[13], examined the moral ramifications of deploying chatbots in higher education.

Overall, this study will look at the effects of chatbots on the educational system from the viewpoints of students and teachers or trainers, as well as their beneficial effects. It will also discuss potential developments and future perspectives for chatbot use in research and education. The study will employ a qualitative research technique and an exploratory research approach.

2. Literature Review

The idea of a chatbot first gained traction around the same time as Alan Turing proposed the Turing Test, which asks "Can machines think?" ^[14]. In order to serve as a psychotherapist and respond to user input as questions, Eliza, the first known chatbot, was built in 1966 ^[15]. It responded to the user's question using a template-based response system and pattern matching algorithms ^[16]. In 1972, a Chatbot named PARRY was developed with ELIZA^[17]. A prize-winning chatbot named Alice was developed in 1995. It received the yearly Turing Test prize. A Loebner Award. The first chatbot that was viewed as "human Computer" was named Alice. It defined its fundamental operations using pattern matching and Artificial Intelligence Markup Language (AIML) ^[18]. Modern chatbots are being created as a result of technological advancements, such as Smarter-Child ^[19]. Google Assistant, IBM Watson, Apple Siri, Amazon Alexa, Microsoft Cortana, and Amazon Alexa Since 2016, there has been a tremendous increase in chatbot development, leading to the development of numerous types of chatbot systems for industrial applications.

The employment of conversational bots, such as ChatGPT, as a tool for improving online learning experiences was the subject of an exploratory study by [20]. They discovered that due to the more interesting and interactive experience they offered, students preferred employing conversational bots for learning tasks. Furthermore, [21] discovered that chatbots can offer students tailored learning opportunities, immediate feedback, and support. Additionally, the research discovered that chatbots may raise student interest and motivation in their studies. Likewise, a different study [22] investigated the possible application of chatbots in higher education. According to the study, using chatbots in the first year of university studies makes it easier for students to adjust to their new environment and boosts their interest in their coursework. The research revealed a beneficial relationship between chatbot use, study engagement, and peer engagement. The chatbot, according to the students, made it easier for them to contact with their program leader and get support.

The ethical issues surrounding the use of chatbots in educational assessments were examined in a research by King on ChatGPT [23]. The authors emphasized the risk of cheating and the requirement to maintain the validity of tests while utilizing chatbots. They also emphasized the necessity to guarantee that chatbots are impartial and fair as well as the significance of taking the ethical implications of AI systems into account. Therefore, there is a chance for cheating when chatbots are used in educational examinations. By entering queries and getting real-time responses, students can utilize chatbots to cheat on examinations or other assessments. This compromises the validity of exams and may give chatbot-using pupils an unfair advantage. The use of chatbots in tests and evaluations also raises concerns about the use of technology in education. According to Alam's research [24], the use of chatbots in tests and assessments favors technology solutions over established educational practices, potentially devaluing the value of human teachers and educators in the process.

The possibility for bias in chatbots is one ethical issue. The data that AI systems are taught on determines how objective they are. The chatbot's responses can be skewed if the data used to train it was biased. As well as potentially perpetuating discrimination and inequality in the realm of education, this could lead to unfair evaluation outcomes [25]. Chatbots have become a popular educational technology with the potential to improve learning by giving students rapid, individualized feedback. However, there are ethical issues that need to be resolved when using chatbots in the educational sector.

3. Methodology

To identify present practices, issues, and opportunities, a thorough analysis of the major potential issues related to chatbot use in research and teaching was done. A fundamental grasp of the subject is provided by this exploratory effort, which also influences future research plans. We examine the key viewpoints on the effects and substantial difficulties brought on by the broad application of ChatGPT and other generative AI technologies. There are two primary steps in the study paper. The first step consists of recognizing the drawbacks of using chatbots in research and education. The second stage, which addresses preventing chatbots from being used improperly in research and teaching, makes use of expert knowledge. Given that it enables researchers to obtain preliminary data and insights on the possible application of AI systems and chatbots in the academic area, an exploratory research strategy may be advantageous in this situation.

Exploratory research, according to Creswell [26], is done to become familiar with a phenomenon or to generate fresh ideas and hypotheses about it. Flstad and Taylor [27] conducted a qualitative study using an exploratory research methodology in a prior study to examine the use of chatbots in customer support. Similarly, the real research offers insightful information on the possible advantages and disadvantages of using chatbots and AI systems in research and education, as well as the moral ramifications of doing so.

4. Result

4.1 Negative Impact of Chatbot on Education system

Chatbots have substantially advanced with the development of AI and NLP technologies, becoming better able to handle complicated tasks and engage in more human-like interactions. These days, chatbots are utilized in a variety of sectors, including customer service, healthcare, finance, and education. In general, chatbot development is a result of improvements in AI and NLP technologies as well as the rising demand for more effective and practical methods to communicate with technology. ChatGPT is one of these NLP tools that is frequently applied in the education field. The most recent version of ChatGPT, which was released at the end of 2022, was trained on conversational data and optimized for particular tasks, such responding to chatbot requests or answering questions. ChatGPT can produce human-like responses to a variety of inquiries and prompts because it was trained on a big dataset of text from the internet. The advent of ChatGPT and other GPT models has advanced the fields of NLP (Natural Language Processing) and conversational AI, enabling the development of more sophisticated and human-like conversational AI systems.

It is against the fundamental principles of learning and academic integrity to use chatbots or any other artificial intelligence tools to answer exam questions because doing so constitutes academic misconduct and cheating. Therefore, chatbots could cause significant ethical issues in education if utilized inappropriately by pupils. By impeding their capacity to think critically, be creative, and apply what they have learned to real-world circumstances, it may also negatively impact the student's academic development and knowledge acquisition processes. Consistent findings from a trustworthy evaluation procedure should show the students' true qualifications and competencies. It is crucial to establish the validity of the evaluation process in order to ensure that the results collected are valid and relevant for decision-making in the context of examining the potential of AI systems and chatbots in the academic sector and their impact on research and education. The authenticity and dependability of the assessment results could be jeopardized if students utilize chatbots to cheat on examinations or assignments. Chatbot assistance results in unfair benefits and incorrect assessments of the pupils' knowledge and abilities.

Concerns have been expressed regarding how chatbots will affect future generations' educational attainment, as was evident. We could contend that utilizing chatbots might result in a decline in critical thinking abilities and a lack of self-sufficient problem-solving skills. This might produce a generation of kids who are too dependent on technology and incapable of critical or creative thought.

4.2. Positive Impact of Chatbot on Education system

In the academic setting, a chatbot can be an effective research assistant. They are regarded as effective methods for gathering data. In reality, chatbots are able to efficiently gather, process, and supply researchers with pertinent data for their study. AI research assistants, as opposed to human research assistants, have unlimited availability and production capacity. Because chatbots are available around-the-clock, researchers may gather data and get information whenever they want, no matter where they are. They offer individualized services. As a result, chatbots can tailor the information they deliver based on the researcher's preferences, improving the objectivity, effectiveness, and personalization of their research process. In the end, the application of chatbots in research can result in enhanced cooperation, better-coordinated efforts, and superior research outputs. These chatbots must, however, meet support requirements and cannot take the place of the researcher, who plays a crucial role. These chatbots require constant, detailed supervision, just like human research assistants do, in order to prevent derivations.

In a tabulated style with examples of each chatbot application, a thorough analysis of the many types of chatbot software available, their characteristics, and their effects on students and teachers are presented.

Table 1. Tabulated features and impact of chatbot application on Students and Teachers

Types of chatbot/Name	Features	Impact on Students	Impact on Teachers
Personalized Learning Chatbot (Socratic)	Personalized learning support such as: tailored feedback, practice questions, and learning resources.	Learn more effectively and efficiently.	Free up teachers time so they can focus on more personalized instruction.
Administrative Assistants Chatbot (Schoology Bot)	Automate administrative tasks, such as scheduling appointments, managing student records, and providing customer service.	Save's teachers and administrators time and hassle.	Free up teachers and administrators to focus on more important tasks.
Virtual Tutor Chatbot (Wyzant)	Provide tutoring services, such as help with homework, test prep, and college admissions.	Help students improve their academic performance	Provide teachers with additional support for students who need it.
Social Emotional Learning Chatbot (7 Cups of Tea)	Provide support for students' social emotional learning, such as helping them manage stress, build relationships, and make decisions.	Help students develop the skills they need to succeed in school and life.	Provide teachers with additional support for students who need it.

5. Conclusion

This study acknowledges that chatbots and AI systems have a lot to offer the academic world and that their use will probably grow over the next several years. However, for researchers and educators to fully realize the potential use of AI in research and education, it is crucial to critically analyze the ethical and technological implications of AI systems and make sure they are used in a responsible and transparent manner. The study lends credence to claims that AI has the ability to enhance research productivity and accuracy, tailor learning experiences, and increase access to and inclusion in education. But it's crucial to stress the need for a critical assessment of the ethical and technical consequences of AI and for its responsible and open deployment. Chatbots should be used to supplement human knowledge, discretion, and creativity rather than to replace it. It is crucial for researchers to assess the information offered by chatbots once they are employed in study and to confirm it before employing it.

It should be highlighted that there would be many of the negative effects described earlier in the study if there were no legitimate ethics guiding the usage of chatbots in the educational system. More quantitative study and analysis are required for upcoming work.

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