

AI in Education: Navigating the Terrain of Strengths, Weaknesses, Opportunities, and Threats

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Abstract

This study conducts a SWOT analysis to evaluate the application of ChatGPT in education, identifying its strengths, weaknesses, opportunities, and threats. ChatGPT's strengths include providing personalized learning experiences, immediate feedback, and continuous availability, enhancing student engagement and learning diversity. However, weaknesses involve the potential for misinformation, lack of deep understanding, and risk of student dependency. Opportunities lie in bridging educational gaps in underserved regions, supporting teachers by automating routine tasks, and enhancing interactive learning environments through technological integration. Conversely, threats include data privacy concerns, exacerbation of educational inequalities, diminishing teacher roles, and facilitating academic dishonesty. The analysis concludes that while ChatGPT offers significant educational benefits, careful implementation and ongoing evaluation are essential to mitigate risks and ensure it effectively supports the educational process.

Keywords: ChatGPT in education, Personalized learning, Educational technology, AI in education, SWOT analysis

INTRODUCTION

One of the technical developments that is relevant to be created for any purpose is artificial intelligence (AI). One technology that is developing quickly is artificial intelligence (AI). The study of artificial intelligence (A.I.) is a branch of computer science that aims to address cognitive issues like learning, pattern recognition, and problem-solving that are typically associated with human intelligence (Fitria, 2023). A private research facility called Open AI works to advance and guide artificial intelligence in ways that are advantageous to all people. With its headquarters located in San Francisco, the company was created in 2015 by Elon Musk, Sam Altman, and others.

The increasing speed of technology innovation and global interconnectedness has brought to enormous changes in the economy, environment, and society. The collective name for all of these changes is "megatrend." As the twenty-first century progresses, these megatrends should continue (Haluza & Jungwirth 2023). An AI tool called Chat GPT was released by Open AI in November 2022. It's an artificially intelligent Chatbot, Chat GPT is an Open-AI component. A generative language model called Chat GPT (Generative Pre-trained Transformer) is built on the transformer architecture (Sharma & Yadav, 2022). The economy, the environment, and society have all been significantly impacted by the quick growth of technology and the globalization of society. More recently, breakthroughs in artificial intelligence have produced innovations like as OpenAI's ChatGPT (Mhlanga, 2023a). Open AI created ChatGPT, a language model that responds in natural language to a prompt or input by utilizing cutting-edge artificial intelligence techniques (Kalla & smith., 2023a). OpenAI's Generative Pretrained Transformer (GPT) language model has been reworked into modern language models such as ChatGPT. The aim of this technology is to produce writing that is identical to information written by humans. It has the ability to have user conversations in a way that is surprisingly straightforward and understandable (Mhlanga, 2023). There was a lot of anticipation for the launch of ChatGPT as well as concern about potential implications for education (Kasneci et al.,2023). ChatGPT is a chatbot that can be accessible via a variety of channels, including a messaging app, internet, and smart phone app. It allows users to communicate with it by voice or text, and it responds instantly (Biswas., 2023) Being a sophisticated chatbot, it can manage a wide range of text-based tasks, from straightforward question-answering to more involved tasks like composing thank-you

messages and fixing productivity issues. Furthermore, ChatGPT's capacity to supervise writing quality could be helpful in the educational sector, possibly aiding in the grading and provision of feedback on student assignments (Lund & Wang., 2023). The emergence of ChatGPT in education has wide range of applications for the learners as well as for educators. AI has the power to fundamentally alter the way we instruct and acquire knowledge in the classroom (Dar et al., 2024a). ChatGPT's primary goal is to facilitate people's access to information and task completion by offering precise and useful answers to their inquiries. It is capable of producing responses to cues and inquiries that are comparable to those that a human might produce. For jobs like creating content, translating text, and responding to inquiries, this might be helpful. Because Chat GPT can automate a wide range of jobs, it has drawn a lot of attention and could have an impact on industries including customer support, translation, and content creation (Haque, 2022). It also offers potential as a teacher support tool, automating routine tasks and providing personalized feedback to students. Continual improvement through refinement and training of its models can enhance its accuracy and responsiveness. Moreover, specialized educational applications, such as language learning or tutoring, present avenues for further development (Dar et al., 2024b). With so many powerful features, ChatGPT is an amalgam of several technologies, including reinforcement learning, deep learning, in-context learning, multi-task learning, unsupervised learning, and instruction fine-tuning. An intelligent chatbot named ChatGPT can respond to instructions in a prompt manner and give a thorough explanation (Wu et al., 2023). The primary objective of this research is to do a comprehensive SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis of Chat GPT's impact on the education industry. This analysis attempts to provide a thorough grasp of the tool's possible advantages, limitations, and challenges within the educational environment by analyzing its strengths, flaws, possibilities, and threats.

Introducing Chat GPT

ChatGPT has evolved over its history, with each new version improving on the capabilities of the prior one. With 117 million parameters, the GPT-1 model was the first in the GPT (generative pre-trained transformer) series when it was released in June 2018. This established the foundation for ChatGPT as it exists today (Nag et al., 2023a). In order to produce an effective language model, OpenAI expanded the dataset and parameters used in the GPT-2 in 2019. In a

similar manner, GPT-2 carried out the transformer architecture's decoder. Ten times more parameters than its predecessor, GPT-1, were used to train GPT-2(Qammar et al., 2023a).

GPT-3 was a significant advancement in June 2020. 175 billion parameters were used in the training of this model. Its vast text-generation capabilities have led to its widespread use in a variety of applications, ranging from writing articles and letters to poetry and even computer code. Additionally, it could converse in multiple languages and respond to factual inquiries (Nag et al., 2023b). Based on the GPT-3 architecture, ChatGPT-3.5 has 175 billion parameters and is distinguished by its few-shot learning capabilities and capacity to produce coherent text sequences (Wickman et al., 2023). Ultimately, GPT-4 is the most recent iteration of Open AI's GPT series. It processes textual or visual input and outputs text in a substantially faster time frame than its predecessors. Additionally, GPT-4 is pre-trained to predict the next token in a document (Qammar et al., 2023).

SWOT Analysis

A strategic planning technique called the SWOT analysis is used to find and evaluate both internal and external factors that can have an impact on a project's or business's success (Leigh, D. 2009). The acronym SWOT, which stands for strengths, weaknesses, opportunities, and threats, was first used as a framework to study organizational strategies in the early 1950s. (Benzaghta et al., 2021). The SWOT analysis is an organized process for gathering information from various sources and provides an overview of the external (threats and opportunities) and internal (strengths and weaknesses) factors that could affect the adoption of new technologies in the classroom (Farrokhnia et al., 2023a).

The goal of this chapter is to discuss ChatGPT's use in education from all angles, both advantages and disadvantages. For the educational sector, a SWOT analysis of ChatGPT can provide details on its benefits, drawbacks, possibilities, and threats. I initiated this chapter by asking chat GPT, what are the strengths, weaknesses opportunities and threats of Chat GPT in education. The response it generated was: Certainly! Here's an analysis of Chat GPT's strengths, weaknesses, opportunities, and threats in the context of education:

Strengths

- **Knowledge Base:** Due to its extensive knowledge base, ChatGPT is a useful tool for responding to questions about education in a timely and precise manner..
- **24/7 Availability:** ChatGPT can operate round the clock, providing instant assistance to students and educators regardless of time zones or schedules.
- **Personalized Learning:** It can adapt its responses to the individual needs and learning styles of students, offering personalized learning experiences.
- **Cost-effective:** ChatGPT can potentially reduce the need for human instructors or tutors, making education more affordable and accessible.
- **Scalability:** It can handle a large number of users simultaneously, making it suitable for use in both classrooms and online learning platforms.

Weaknesses

- **Lack of Emotional Intelligence:** ChatGPT lacks emotional intelligence and empathy, which are crucial for understanding and addressing the emotional needs of students.
- **Limited Creativity:** While ChatGPT can provide information and answer questions, it may struggle with tasks that require creativity or critical thinking skills.
- **Language Limitations:** ChatGPT's effectiveness may be limited by language barriers, as it may not be able to understand or communicate in all languages fluently.
- **Dependency on Data Quality:** The quality of the data that ChatGPT was trained on determines how accurate its responses will be; this data may contain biases or mistakes.
- **Privacy Concerns:** When using ChatGPT, there can be worries regarding the security and privacy of student data, particularly if private information is exchanged.

Opportunities

- **Supplemental Learning Tool:** ChatGPT can be utilized as an extra learning aid to improve conventional teaching strategies, giving students access to more resources and assistance.

- **Customization for Specific Subjects:** It is more effective in specialized educational contexts since it may be educated and adapted precisely for particular courses or curriculum.
- **Integration with Learning Platforms:** ChatGPT can be integrated into existing learning platforms and educational software to enhance their functionality and provide instant support to users.
- **Continual Improvement:** Through ongoing training and updates, ChatGPT can continually improve its accuracy and effectiveness in addressing educational needs.
- **Remote Learning Support:** In the era of remote learning, ChatGPT can serve as a valuable resource for students who may not have access to in-person instruction.

Threats

- **Job Displacement:** Human tutors and educators may lose their jobs if artificial intelligence (AI) tools like ChatGPT are widely used in the classroom.
- **Resistance to Technology:** Due to worries about job loss, privacy, or the dehumanization of education, some instructors, students, and parents may be resistant to the incorporation of AI into the classroom.
- **Ethical Concerns:** The ethical issues of data privacy, algorithmic biases, and the fair distribution of educational resources are brought up by the use of AI in education.
- **Technological Limitations:** ChatGPT's effectiveness may be limited by technological constraints such as internet connectivity issues or hardware compatibility issues.
- **Competitive Landscape:** There may be competition from other AI-driven educational tools and platforms, which could impact ChatGPT's market share and adoption rate.

REVIEWED RESULTS

Strengths: A study of the scientific literature highlighted some of Chat GPT's main strengths:

Vast Knowledge Base: A vast array of text sources and prompts have been used to train ChatGPT, so it can provide knowledge and analysis on a variety of academic contexts and topics. By sourcing data from the vastness of the internet and integrating it into its huge repository,

ChatGPT's extensive encrypted knowledge base enables it to provide researchers with relevant and up-to-date content from a wide range of areas. According to a number of specialists, ChatGPT can simplify the process of quickly composing and designing the literature review for any scientific project or research by distilling complicated study themes down to their fundamental elements. (Kalla & Smith, 2023b).

Responsiveness: The primary advantage of ChatGPT for education is its excellent response. Students' inquiries can be quickly and contextually answered by this model, resulting in an interesting interactive experience. Teachers and students can go deeper into topics because of its capacity to comprehend human language in complex circumstances. This responsiveness can be leveraged to create a dynamic learning environment by generating conversation in class, offering more explanations, or giving immediate feedback. (Farrokhnia et al., 2023b)

Security and privacy: Concerns about privacy and security are also present. There are concerns about the processing and storage of student data when considering that ChatGPT operates by evaluating and storing conversation data. Adequate protection of students' personal information is crucial, and stringent privacy regulations must be put in place to deal with this problem. (Zhu et al., 2023).

Feedback: ChatGPT is a helpful resource for receiving prompt feedback.. This ability helps to create a positive and encouraging learning environment by promptly recognizing and fixing errors (Alabool., 2023a), ChatGPT's capabilities are seen in its capacity to help with assessment. This methodology can be applied to exam or assessment exercises, as well as to rectify student work and offer helpful criticism. As a result, teachers can spend less time correcting mistakes and more time concentrating on teaching activities that call for one-on-one instruction. Support for this assessment also creates chances for the creation of adaptive assessment systems that may modify the degree of difficulty to suit each student's unique ability (Aripin et al.,2023).

Personalized learning: GPT has the potential to completely transform education by giving kids individualized learning experiences, enhancing their writing and language abilities, and freeing up teachers' time for labor-intensive assignments. It's imperative to remember that GPT should be utilized in addition to, not instead of, human teachers in order to enhance learning (Bozic., 2023).

Self-Improvement Capability: Among its distinctive features is ChatGPT's capacity for self-learning and development. More sophisticated than current AI chatbots, ChatGPT uses generative pre-training (GPT). AI text generator GPT enhances its language model through user input and reinforcement learning (Perez et al., 2017). With the help of this functionality, ChatGPT may improve and adjust responses in response to input from human raters (Stokelwalker., 2022). Additionally, ChatGPT is continuously updated with new data thanks to ongoing improvements to its training set, which enables it to becoming increasingly accurate over time.

Conversational Learning: It can engage learners in conversational interactions, promoting active learning and critical thinking. This approach can be particularly helpful for developing communication skills (Oranga, 2023).

Weaknesses: Notwithstanding its strengths, ChatGPT has a number of weaknesses and restrictions, which are detailed below.

Lack of social interaction: The social and emotional exchanges that take place in in-person contacts cannot be replaced by ChatGPT, despite the fact that it can mimic discussions. An excessive amount of ChatGPT use may result in poor social skills and diminished empathy (Bozic ., 2023)

Insufficient comprehension: The words that ChatGPT interprets have meanings that it does not fully understand. (Gao et al., 2023) Though it can't fully comprehend the meaning contained in the words, it can identify patterns and come up with sensible answers. (Bogost , 2022) This could lead to occasionally ignorant and shallow reactions. (Borji, 2023) and possibly unnecessary (Gupta et al., 2023), particularly when doing tasks that require a deep understanding of a particular subject.

Dependence on technology: The dependence on technology is one of the drawbacks of implementing ChatGPT in the classroom. The entire learning process will suffer from excessive or improper use of ChatGPT. Excessive usage of ChatGPT by students may cause them to lose focus on important learning goals including problem-solving, critical thinking, and interpersonal skills. It will surely be tough for students who just use technology to solve problems to achieve effectively in the real world (Alabool., 2023).

Inability to Verify Information: Lack of independent verification or fact-checking of the material offered by ChatGPT is another issue that could lead to the dissemination of inaccurate or unreliable information. One potential contributing aspect is that ChatGPT exclusively utilizes well-known data for training. Therefore, it would probably provide accurate or at least seeming believable information if it were questioned about, say, well-known individuals. On the other hand, it frequently gives incorrect answers in response to questions concerning less well-known people. It unintentionally spreads "fake news" since it is unable to independently verify the material it generates. Sadly, those who have no prior knowledge of a subject would probably believe the misleading information that ChatGPT generates (Giray et al., 2024)

Ethical issues: If the ChatGPT was used to support academic dishonesty or any other unethical behavior (such as plagiarism, cheating, harassment, and data fabrication), it would have a detrimental impact on learning integrity. To be more specific, students can create essays and research papers using ChatGPT, which they can then turn in as their own original work. This encouraged plagiarism, which undermined the integrity of the learning process. Additionally, students can cheat on exams and quizzes by using ChatGPT. This might encourage cheating and diminish the significance of academic success. Additionally, ChatGPT may be used to falsify or manipulate data in order to get acceptable research outcomes in science, which compromises the objectivity of the study (Alabool., 2023c)

Lack of in-depth understanding: According to (Klimova et al., 2023), The meaning of the phrases that ChatGPT processes is not fully understood by it. Despite its ability to recognize patterns and generate credible responses, ChatGPT is not entirely capable of understanding the ideas contained in the words (Carr et al., 2022). When completing activities that call for a nuanced understanding of specialized domain knowledge, this might lead to responses that occasionally lack depth and insight (Chan & Zary, 2019) as well as the propensity to stray from the subject (Küçük et al., 2016); (Paranjape et al., 2019). Research findings indicated that ChatGPT was able to produce workable answers for challenging pathological issues, but the solutions lacked a thorough comprehension of the theoretical ideas (Reiss, 2021). As long as a method exists to acquire the deeper and more complex understanding required for a more meaningful understanding, this limitation need not always be an issue (Mesiono et al., 2024).

Lack of Higher Order Thinking Skills: While ChatGPT can aid in the creation of intricate learning objectives, these chatbots are not proficient in subjects that call for higher order cognitive abilities, like critical and analytical thinking. The primary cause of this is the excessive dependence of artificial intelligence systems on taught data, which results in a lack of context (Kucuk et al., 2016), common sense (Chan & Zary, 2019), and emotions (Zhao et al., 2020) all of which are necessary for higher-order thinking.

Cheating in examinations: Because chatbots like ChatGPT can respond to queries instantly, they might be used to complete assignments without really doing the job or cheat on exams. The use of the platform not only jeopardizes the integrity of the educational system, but it also hurts students who lack access to these resources because teachers were unaware that their students were rating those who use it higher (Adeshola & Adepoju., 2023)

Opportunities: Teachers and students in higher education may benefit from ChatGPT in a variety of ways. The following is a description of ChatGPT's main educational offerings:

Personalized Learning Support: Teachers can provide personalized learning support to their students by using ChatGPT. ChatGPT can provide tailored materials and learning activities based on a student's requirements and preferred method of learning. Teachers can utilize ChatGPT, for example, to examine statistics on student performance and pinpoint areas in which students are having difficulty understanding specific ideas or algorithms. It is possible for a teacher to observe that a specific student is having difficulty sorting algorithms. In this scenario, the teacher can use ChatGPT to create resources that are specifically tailored to the student's learning preferences and skills (Rahman & Watanobe., 2023). Students at varying levels of complexity may benefit from personalized support and feedback via ChatGPT.

Increasing accessibility of information: ChatGPT might provide educators and learners with simple access to content on a range of platforms (such websites and smart phone apps) and in a number of sectors. It is also a more useful tool than traditional search engines because it returns a written response instead of just a list of references (Farrokhnia et al., 2023). From an educational standpoint, this implies that ChatGPT can free up students' access time so they can read and think critically about a given material for longer. Teachers can find and create suitable teaching

resources with the help of ChatGPT. Additionally, it can help them create lesson plans with a set of guidelines and restrictions. (Halaweh, 2023)

Decreasing teaching workload: There is a good chance that ChatGPT will significantly lessen the workload of teachers. It can be used, for instance, as a tool for providing feedback on activities, essays, and projects for students (Qadir, 2022). Teachers can quickly and easily provide students comments on their essays (Mizumoto & Eguchi, 2023).

Collaborative Brainstorming: Researchers can explore various viewpoints on research difficulties and generate ideas by using ChatGPT to assist brainstorming sessions. ChatGPT is more than capable of offering its own opinions on a variety of subjects. One tip for making the most of this feature is to give it a vague, open prompt. It's crucial to avoid becoming overly detailed as this could make ChatGPT difficult to use. When researchers receive the results, they will be better able to work with their colleagues and brainstorm utilizing the original concepts that ChatGPT developed (Giray et al.,2023). AI chatbots can help in cooperative education by giving professionals or students a place to exchange ideas, work through issues, and collaborate to achieve common goals. (Abujaber et al., 2023)

Innovation: Experts agree that using ChatGPT in the field of education can spur innovation in the approaches used for instruction and learning. They said that one way to accomplish this would be to provide educational institutions the freedom to develop fresh, more efficient methods of imparting knowledge (Alabool., 2023)

Multilingual support: There is a great need for language translation and multilingual assistance, which presents ChatGPT with a chance to increase the number of languages it speaks (Jarinaa et al., 2023).

Threats: While the benefits of ChatGPT offer a multitude of educational options, its drawbacks present the following threats:

Misinformation and Disinformation Propagation: One major risk that ChatGPT presents to scientific research is the dissemination of incorrect information. Misinformation is defined as inaccurate or false information that conveys the facts incorrectly. Contrarily, disinformation is deliberately false information that aims to deceive and mislead. Sometimes ChatGPT provides

erroneous or misleading results since it is not flawless. The patterns in the vast amount of data that ChatGPT was trained on inform the responses that it produces. It might nevertheless produce "responses that resemble factual information" (Khan, 2023) even though they are false or misleading.

Lack of understanding of the context: Many problems can arise from a lack of knowledge about the meaning and context of words, particularly in the realm of education. For example, ChatGPT utilized for personalized learning may not fully understand the curriculum, the cultural background of the student's home, or each individual student's particular learning style. As a result, suggestions for information that is either too difficult or too simple for the pupils may be given. An additional instance is the utilization of ChatGPT for essay grading, which might not possess the necessary background information and context to fairly assess an essay (Farrokhnia et al., 2023).

Lack of transparency: It's challenging to comprehend how ChatGPT generates forecasts or recommendations due to its intricate algorithms. Therefore, due to a lack of transparency, a supply chain might not be able to assess ChatGPT's performance or validate its findings (Bahrini et al., 2023)

Critical thinking and problem-solving skill: On the basis of problem titles, descriptions, and methods, ChatGPT may generate partially or entirely right programming code in addition to almost accurate answers to technical queries on a wide range of topics. It may be detrimental to pupils' development of critical thinking and problem-solving abilities to rely solely on ChatGPT for answers and code. The solution codes produced by AI models can be utilized for academic coding competitions and assessments, as there are currently no tools available that can comprehend code written by AI models. The question of how to handle this odd situation is currently plaguing teachers (Rahman and Watanobe., 2023)

Technical issues: ChatGPT may encounter issues, server failures, or issues with specific software or data formats, just like any other technology, which could impede research and instruction (Bahrini et al., 2023).

Democratizing Plagiarism in Education/Research: In addition to encouraging plagiarism and cheating (Motlagh et al., 2023) and being prone to mistakes like providing misleading

information (Elbanna & Armstrong, 2023), ChatGPT has brought up a number of ethical concerns. No ChatGPT response, according to OpenAI, is an exact replica of a particular text; instead, it is produced by combining training data. However, the model might produce results that are comparable to those from other sources. In a recent test, ChatGPT produced a 500-word article that was 45% identical to an already-published source, demonstrating this (Halaweh, 2023). Mike Sharples' caution that "GPT democratizes plagiarism" is therefore not shocking (Dogan et al., 2023). Because of ChatGPT's intriguing features, students might utilize it without recognizing that it could result in plagiarism. Furthermore, there's a good chance that plagiarism in academic settings will increase. Research papers at respectable publishing standards can be produced using ChatGPT, according to empirical investigations (Qin et al., 2023) and it can create scientific abstracts with fictitious data that reviewers might miss (Rawas, 2023). This feature might persuade college students to write their academic essays entirely using ChatGPT. Given that ChatGPT is prone to creating, this ethical dilemma becomes much more pressing. As a result, the application of ChatGPT and related AI models requires stringent ethical constraints in addition to tight supervision. Governments, IT firms, and educational institutions must collaborate to create laws and policies that might lessen the possibility of plagiarism, cheating, and other problems that could result from using Chat GPT. To guarantee that Chat GPT users comprehend the repercussions of their acts and apply the proper principles in their learning and research processes, ethics and academic integrity education also need to be strengthened (Lee, 2023). Furthermore, concerns have been raised about the difficulty of plagiarism detection software identifying writings produced by AI, which could make it difficult for educators to identify and deal with instances of academic dishonesty. (Adeshola & Adepoju, 2023).

Discussion and Conclusion

The world of education has seen a transformation thanks to Chat GPT, an inventive chatbot driven by AI that has both positive and negative effects. We examined Chat GPT's impact on education in this chapter, going over its advantages, disadvantages, opportunities, and difficulties. It is crucial to comprehend how chatbots are influencing education as they become more and more common in the educational setting. Teachers are essential in helping kids utilize Chat GPT appropriately and in developing their critical thinking skills. Striking a balance between utilizing the advantages of AI tools like Chat GPT and maintaining the need of human

connection and critical thinking in education is crucial as technology develops. There are several benefits and drawbacks of using ChatGPT and other large language models (LLMs) in higher education. On the one hand, ChatGPT is an effective artificial intelligence technology that could revolutionize the education industry. Its capacity to carry out intellectually stimulating and knowledge-based tasks, including assigning grades and providing guidance to students, might completely transform the way that education is delivered. By assisting students in coming up with ideas for their homework, examinations, and writing assignments, Chat GPT has the potential to improve their educational experiences. However, there are drawbacks to incorporating AI into education, such as the requirement to ensure the accuracy and dependability of responses produced by AI and worries about teacher replacement. Academic fraud, bias, faked data, and inadequate evaluation methods could prevent students from obtaining important graduate skills and promote superficial learning. Higher education teachers and students must exercise prudence to ensure the moral, trustworthy, and effective use of new technologies for academic objectives. The use of AI in education must strike a balance with maintaining the human element and interpersonal communication, which are crucial to the transfer of knowledge. Future studies should evaluate Chat GPT's effectiveness in improving student learning outcomes and take into account the ethical and legal implications of implementing AI in the classroom. In order to make sure that learning is advanced rather than impeded, it's also crucial to think about how to integrate Chat GPT and other AI technologies into the classroom in a way that supports instructors rather than replaces them.

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