Artificial Intelligence in Education: An Argument of Chat-GPT Use in Education

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***Abstract*—Artificial intelligence (AI) is a popular concept for modernizing and automating traditional, time-consuming tasks with smart technology. AI can be applied to a wide range of areas, such as healthcare, finance, law, and education. AI has the potential to revolutionize the way we learn by making education more interactive and engaging. One possible step The way forward in this field is through the use of generative artificial intelligence.technologies like the ChatGPT conversational agent. Although enthusiastic techno-utopian cheerleaders are praising the tool.for answering questions, writing essays, summarizing documents,and generating sophisticated codes, it has some pitfalls that were acknowledged by the creators of OpenAI themselves. In this article, we discuss the application of artificial intelligence in education and put the trendy ChatGPT to the test in an educator-Learner context to see how it performs. We also discuss some of the benefits and drawbacks of ChatGPT and demonstrate how it might be utilized in the classroom. It is essential for educators to understand the implications of this technology and to investigate Strategies to modify the educational environment**

***Index Terms*—Artificial Intelligence, ChatGPT, AIED, intelligent agents, assessment, intelligent tutoring systems,personalized learning**

I. Introduction

Artificial intelligence (AI) is described as an area of science, and engineering concerned with the computational understanding of human behavior and the construction of instruments that show such behavior in an understandable manner [1]. AI may be defined as the use of computer programs to comprehend human behavior and to react intelligently to such behavior using logical reasoning.

The term ”artificial intelligence” in and of itself may be received with skepticism since its current usage may reflect different meanings to different people depending on the domain where it is being used. Alternatively, other academics favor augmented intelligence, which acknowledges humans' brains as the ultimate source of intelligence while seeing computers and software just as a powerful tool for expanding our minds. With this method, computers are used to do tasks. that people would otherwise have to perform manually. Even If augmented intelligence is more accurate or helpful, the The argument between augmented and artificial intelligence will continue to go on indefinitely [2].

Modern education uses modern technology to advance the learning process [3] [4] [5] [6]. Specifically, several industries currently creatively use AI. We are in the early stages of educational innovation; several studies are being conducted, and basic ”commercial” applications are also available, albeit they are not often utilized. AI conceals and entangles broader educational trend, notably the use of computers and ICT [7].As the bulk of developmental studies are concentrated on AI technologies rather than on their applicable or practical components, the spread of AI into new applications Domains, such as education, are slower than technology's advancement [8]. As a consequence, even if some forward-thinking institutions and organizations are doing so, many of The potential uses of AI in education have yet to be properly investigated and used. But, as educators become more aware of the potential advantages that AI may provide in areas like curriculum design, customization, and assessment, we should I anticipate seeing much more of this subject in the years to come. to come. Further study is needed to better understand how AI may improve the teaching and learning processes for both instructors and students in order to reach the full potential of AI in education A focus must also be placed on fostering an atmosphere where AI is seen as a tool to support educators and enhance the educational experience for all students rather than as a substitute for instructors. AI must be responsible and meaningfully integrated into teaching and learning processes in order to be used in the educational sector successfully.

The objective of this paper is to cover the use of AI in education and examples of its current use educators. Further, the article tackles Chat-PT in terms of its capabilities and pitfalls We put ChatGPT to the test and used it inside the classroom with a CIS course and see students' feedback. Since

ChatGPT is relatively new, there are very few academic papers that have tested this phenomenon. When After searching the literature, we found only the following three: articles that discussed ChatGPT in a structured and academic format [9] [10] [11]. The remainder of the The paper is structured as follows: Part II delves into the present. application of AI in education. Part III discusses the novel. phenomenon of ChatGPT and its benefits and drawbacks. We also detail how we put ChatGPT to the test with a student. group in a CIS class. Part IV concludes the paper with some Last thoughts on the application of ChatGPT in the educational setting.

II. Artificial Intelligence in Education

Artificial Intelligence in Education (AIED) is a field that is both derivative and inventive. It incorporates ideas and approaches from related domains like artificial intelligence, cognitive science, and education. Nonetheless, it raises its own wider research challenges and questions: What is the nature of knowledge, and how does it manifest itself? How can a single student be assisted in learning? Which instructional interaction methods are beneficial, and when can we use them? What are some of the common misunderstandings among students? [12]

Although AIED tools inherently instantiate specific learning theories (such as Gagné's "instructionalism" or Vygotsky's "zone of proximal development"), some AIED researchers question the assumptions underlying those theories, attempting to open the "black box of learning" with AI and data analysis techniques [13]. It can be argued that, AIED is highly effective. comprises two major complementary strands: the development of AI-based tools to enhance learning and the application of these technologies to better understand learning (how learning happens and other questions that have long been investigated by the learning sciences and that might be applied in classrooms whether or not AI is being used). For instance, by simulating how students solve an arithmetic issue and highlighting misunderstandings that were previously unknown to educators, researchers and instructors may begin to learn much more about the learner itself, which can then be transferred to conventional classroom procedures [14].

A. AI Application in Education

1) Intelligent Tutoring Systems: The foundation of any teaching situation is communication between the professors and the students. Giving feedback is just as crucial as giving a lecture [15]. Giving feedback to a single student is a difficult undertaking because there are numerous students teaching in a classroom. Several colleges put up the idea of an intelligent learning environment (ILE), a complicated system, and a fusion of LMS and e-learning methods. Fundamentally, ILE is a strategy for enhancing students' learning capacity over the course of their academic careers. Its strategy's fundamental goal is to assist students in learning information relevant to any given field of study. The concept of using AI to increase students' ability to learn from earlier experiences gives rise to the phenomenon of the Intelligent Tutoring System (ITS). A satisfactory improvement in students' capacity to master ICT courses over conventional classroom learning is shown by ITS [2] . In the 1970s, James Carbon introduced the initial concept of ITS with his observation that a computer can serve as a teacher [16]. ITS provides excellent results in several fields, such as physics, chemistry, medicine, and computing. It also provides several examples of different learning systems including AutoTutor [17], Beetle II [18], why2-Atlus [16], etc. Table 1 presents some famous ITS along with their targeted students' domains.

TABLE I
SOME FAMOUS ITS

#	ITS	Target students
1	Beetle II	School students
2	EER-Tutor	University students
3	Auto Tutor	College students
4	Stoic Tutor	I.T. professionals
5	Chicago	University students

Intelligent Tutoring Systems (ITSs) were created to address this challenge, allowing teachers to give students individualized feedback in an efficient and effective manner. By using ITSs, teachers can deliver personalized and timely feedback to each student in the class in a way that would have been impossible otherwise. Through the use of ITSs, teachers can make sure that all their students receive the same quality of feedback and support, regardless of the size of the class. In addition, ITSs provide teachers with a more comprehensive view of student performance and progress over time, making it easier to identify students who may need additional support or help. Thus, ITS can revolutionize the way teachers deliver instruction by providing a more effective, efficient, and equitable way of offering personalized instruction to their students

2) Assessment: AI has revolutionized the field of assessments by providing innovative and efficient methods for evaluating students' knowledge and skills. One prominent application of AI in assessments is automated grading systems. These systems utilize machine learning algorithms to analyze and evaluate students' responses, providing timely and objective feedback. For instance, platforms like Grade scope and Turnitin employ AI-powered algorithms to assess written assignments and detect plagiarism. This approach not only saves educators significant time and effort but also enhances consistency and fairness in grading, as the algorithms follow predefined rubrics. Studies have shown that AI-based grading systems can achieve comparable or even better accuracy than human graders, making them a valuable tool in educational settings [19] [20].

Another way AI is utilized in assessments is through adaptive testing. Adaptive tests are designed to dynamically adjust the difficulty level of questions based on a student's previous responses, ensuring a tailored assessment experience. AI algorithms analyze the responses in real-time, allowing the system to select the most appropriate next question. This approach optimizes the efficiency of assessments by presenting challenging questions to high-performing students while offering additional support to struggling ones. Research

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studies have demonstrated the effectiveness of adaptive testing in improving test accuracy, reducing test duration, and enhancing student engagement and motivation [16] [21]. Adaptive testing systems such as Item Response Theory (IRT) models and Bayesian networks are widely used to implement this approach.

AI-based natural language processing (NLP) techniques have also been leveraged in assessments to analyze and evaluate students' written responses. NLP algorithms can assess various aspects of written communication, including grammar, coherence, and content. By using machine learning algorithms, these systems can provide automated feedback on writing assignments, offering suggestions for improvement and identifying areas of strength and weakness. Such AI-powered writing assessment tools, like E-rater and Criterion, have been extensively researched and validated, demonstrating their effectiveness in enhancing students' writing skills [22] [23] . The integration of NLP techniques in assessments not only saves time for educators but also provides students with immediate feedback, enabling them to refine their writing abilities.

3) Personalized Learning: One difficulty with the teaching approach is that each individual's learning ability differs. This issue causes brilliant students to get bored, while slow learners struggle to grasp new concepts and technology. AI promises to solve this problem via individualized learning. Personalized learning is a subfield of AI that tailors learning material to individual students' needs by evaluating their intellectual level [24]. Personalized learning helps students overcome learning obstacles by tailoring educational material to their specific requirements. Personalized learning is quite beneficial, especially during test seasons. Although customized learning was designed primarily for students in grades K-12, several colleges now use it for their students [24]. Ohio State University is a leader in tailored learning for its students, with a 20 percent increase in intellectual level through 2019. Combining gamification tactics to achieve more personalized learning results [25]. Gamification is the use of game features in non-gaming contexts. It offers several benefits over conventional learning methods [26]. Gamification's leader board feature aids individual student growth by balancing individuals' learning speeds

4) Intelligent Agent: Together with tailored learning technology, robotics is another teaching methodology. Until the last several years, robots were thought to be fantasy, shown in movies, but recent years have proven that bots are an enormously beneficial tool in many parts of life, including education. It is well established that robotics can transform education as well as build a conducive environment for students that facilitates effective STEM learning. Through communicative robots like MiRo-E, students can customize their own programs and learn coding in the most interactive way possible. As a result, robotics for students can become a tool that aids in the understanding of abstract and complex concepts in science and technology courses as well as facilitate creative thinking. However, this is not where the advantages of robotics in education end; it can also serve as a great tool for building teamwork among children. The teacher or educator can come up with interesting programming and coding activities and conduct interactive team challenges with the help of customizable robots such as MiRo-E. [27].

AI-enabled robots in the education sector are becoming increasingly popular, as they can be programmed to teach students in a range of disciplines. Since it is a phenomenon that each student's learning capacity is different, there should be different teaching methods for different students. Thus, AI-enabled robots could offer a better learning experience for students if the robots are programmed to identify each student's individual learning capacity and adjust their teaching methods accordingly. This would allow for a tailored learning experience for each student In addition, AI-enabled robots could eliminate the need for monotonous tasks that take up teachers' time, such as grading papers. Although there is much potential for the use of AI-enabled robots, there are many challenges that could face educators when implementing such tools in education

TABLE II
SOME ROBOTICS TOOLS FOR SCHOOL STUDENTS.

Title	Objective	Target audience
Cubelets	Cubelets help children to learn coding, designing, and other skills. It teaches students by assembling the blocks.	Children aged four years and above
Ozorobot	Ozorobot is a technology program promising to teach students mathematics, computer science, and other science subjects in classrooms, after-school, and at home.	School-level children
Root	The root is mainly designed for students interested in learning to code.	School-level children
NAO	This robot program was developed for particular students who suffer from autism.	Autism children
mBot	mBot is a robot designed for teaching robotics itself. It teaches students about coding, electronics, and other essential content related to robotics.	Children of all levels

III. CHATGPT

ChatGPT, or generative pre-trained transformer, is a natural language processing technology that has been adapted for use in educational settings [28]. ChatGPT was created by OpenAI, which is well-known for developing the text-to-image generator DALL-E, and it is now free to use. It is a pre-trained generative chat that employs natural language processing (NLP). The data it uses to create its own language for reacting to human interaction comes from textbooks, websites, and other publications [29] . ChatGPT, the newest in technology known as "big language modeling tools," doesn't use sentience and doesn't "think" the way humans do." ChatGPT engines are "trained" (programmed and reinforced)

to emulate writing styles, ignore certain types of conversations, and learn from your inquiries. In other words, more complex models can improve responses as more queries are asked, and then store what they have learned for future use [30].

A. What ChatGPT can Do

The main feature of Chat GPT is that it generates responses in the same way that humans would in a text box. Therefore, it is suitable for chatbots, AI system conversations, and virtual assistants [31].

Companies such as OpenAI and Microsoft will very certainly compete with a slew of other competitors (Google, Oracle, Salesforce, ServiceNow, Workday, and so on), so every big vendor will invest in AI and machine learning capabilities. If Microsoft integrates OpenAI APIs into Azure, hundreds of entrepreneurs will use the platform to create domain-specific offers, new products, and innovative solutions. Yet, it is still too early to tell, and we believe that industry-specific and domain-specific solutions will triumph. The following are summaries of what ChatGPT can do in education based on ChatGPT response [32]:

1) Individualized Learning: ChatGPT may act as a virtual tutor, offering students with individualized assistance. It may answer questions, clarify ideas, and give other resources to assist students learn more about a variety of disciplines. ChatGPT may provide personalised learning experiences by adjusting its replies depending on individual student requirements.
2) Homework Assistance: Students often have difficulties when working on homework assignments. ChatGPT can help students solve difficulties and finish tasks by offering tips, explanations, and step-by-step instructions. It may also serve to explain misunderstandings and provide alternate problem-solving techniques.
3) Language Learning: ChatGPT may help language learners by participating in discussions and offering chances for language practice. It may provide comments on grammar, vocabulary, and pronunciation, assisting students in improving their language abilities. ChatGPT may also produce example phrases and communicate with users in interactive language workouts.
4) Research and Information Retrieval: ChatGPT may help students with their research by connecting them with pertinent information and resources. It may answer inquiries on certain subjects, summarize articles or books, and recommend more reading resources. ChatGPT's capacity to comprehend and create human-like prose allows it to assist pupils in navigating massive volumes of material.
5) Writing Assistance: Writing is an important skill in school, and ChatGPT may help in this area. It may give comments on writing samples, assistance with grammar and sentence structure, alternative phrases or words, and advice on essay arrangement and coherence. ChatGPT's text-generation capability may act as a writing partner, helping pupils to properly convey their thoughts.
6) Exam Preparation: ChatGPT may help students prepare for tests by giving practice questions, explanations of ideas, and efficient study tactics. It may replicate test settings and provide students feedback on their performance, assisting them in identifying areas for growth and reinforcing their comprehension of the topic.

B. Limits of ChatGPT

ChatGPT engines are trained (programmed and reinforced) to emulate writing styles, avoid certain sorts of talks, and learn from your inquiries. This is a negative since it may imitate terrible material. Chatbots like ChatGPT need polished, in-depth material to really develop industrial-strength intelligence. It's OK if the chatbot works "very well" if you're using it to break through writer's block. Yet, if you want it to perform consistently, it must source authentic, deep, and expanding domain data. This gadget might be a "disinformation machine" if the information corpus is incorrect and the algorithms aren't "constantly verifying dependability. And one of the most senior AI developers we know warned us that ChatGPT would almost certainly be biased due to the data it consumes [33]

ChatGPT lacks human-like intelligence despite its ability to create language that seems human. It is a statistical machine that sometimes repeats or invents falsehoods and often needs instruction and further tweaking to function effectively. "If only children with easy access to internet-connected devices at home can gain experience with the bot, the digital divide will widen, and students without access will be further disadvantaged" [34]

C. ChatGPT for Education

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D. Experimenting with ChatGPT in the Classroom

In our Computing and Information Science class, we put the ChatGPT to the test. The subject is called "IT Strategy

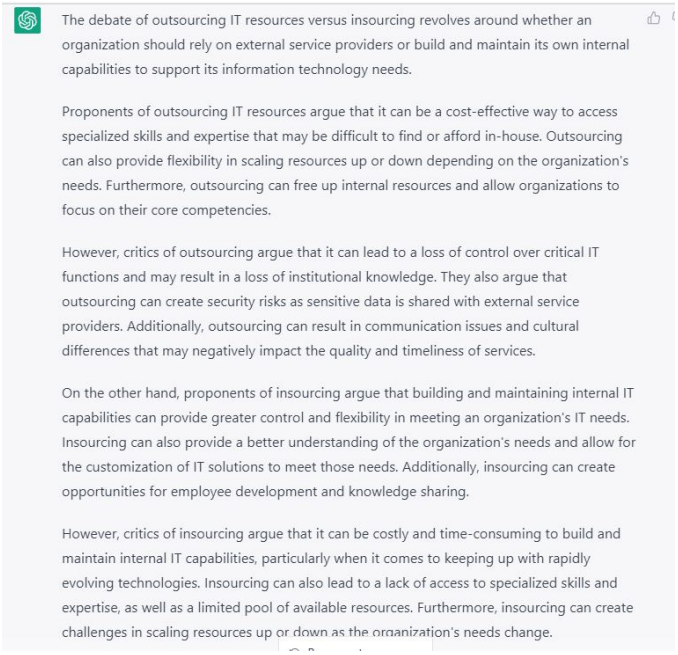

Fig. 1. Cht-PGT Debate Question.

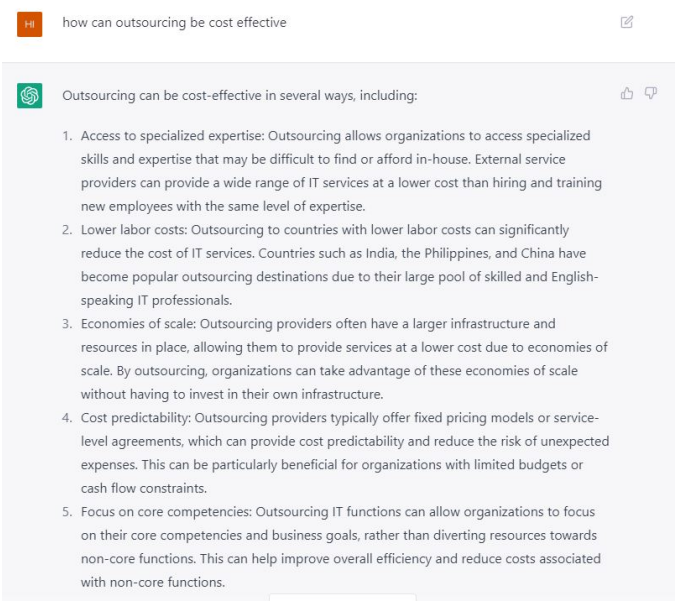

Fig. 2. Cht-PGT Digging.

and Governance," and it is a fourth-year course for students who are ready to graduate. The course covers IS strategy and governance, decision rights, strategic frameworks and procedures, strategy, governance, and performance alignment, and associated change management concerns and schemes. The course emphasizes the fact that IS strategy and governance relate to the assignment of tasks for the control of information systems in order to provide responsibility, participation, predictability, and transparency. The course stresses the board of directors' and senior management's responsibilities in a business, as well as their critical roles in enterprise governance. Two of the course evaluations are based on a discussion in which the teacher selects a disputed subject in information technology and divides the class into two groups: one for and one against the topic. The subject we picked was based on the question: Would you prefer outsourcing as an IT manager, and why? We began the discussion by writing the question on the board and splitting the class into two groups. After 20 minutes of collaboration, the students were ready to defend their positions. People who voted for IT outsourcing cited the following reasons for doing so:

- reduce expenses
- Obtaining the necessary skills required for the job
  Group 2 decided not to outsource for the following reasons:
- inability to exert control
- Concern about privacy
- communication breakdown

After the debate, we invited the two groups to pose the same issue to ChatGPT, and the students received a more thorough response. The solution to the question is shown in figure 1

Students were invited to go further into some of the supplied points in ChatGPT for more clarification. "How can outsourcing be cost effective?" the students questioned, and the response offered five distinct instances where corporations might utilize outsourcing to save expenses. An example of the response is shown in the figures 2

One major finding was that students were astounded that they could acquire the answer by asking one inquiry rather than reading through a Google page. Other students, on the other hand, loved the idea that they had to struggle to obtain the material on Google, and this may educate them better. Three students with high GPAs claimed that ChatGPT may assist other students score higher with a simple step, but they preferred the difficult method of searching Google sites for answers.

To summarize, the majority of the class opted to use ChatGPT to make their job more effective and efficient. While ChatGPT inhibits students from finding solutions and using them rapidly, if utilized appropriately, it has the potential to help students be more creative. Students, for example, may utilize the chatbot to generate fresh ideas or arguments similar to what occurred during our class discussion. One of the students referred to ChatGPT as "super Google." If this is the case, instructors may seek other methods to measure students' creativity if they want to be lazy and employ such a technology. ChatGPT may also encourage instructors to be more creative with projects, such as structuring them to draw on students' personal experiences, knowledge that ChatGPT could not have gleaned from its training data [34]."

IV. Conclusion

The implementation of AI-based apps in the teaching-learning process for students will enable them to get a better understanding and interpretation of their environment (the

world we currently live in). Moreover, this will provide tomorrow's leaders a competitive advantage over other students and bring them up to speed with the greatest educational techniques throughout the globe. While educational intelligence does not require its own subject, it can be optimally incorporated into science and innovation-led activities that not only expose students to new challenges but also create an entirely immersive learning environment, which is the new face of education around the world. ChatGPT is the current manifestation of using AI in education, and it is here to stay. While it might be possible for ChatGPT to provide accurate answers, its results still contain errors, which could mislead instructors and students alike. Kenneth Goodman, a Google engineer, tested ChatGPT on a variety of exams. It received a 70 percent on the United States Medical Licensing Examination, a 70 percent on a bar exam for lawyers, nine out of fifteen correct on another legal test, the Multistate Professional Responsibility Examination, a 78 percent on the multiple choice section of New York State's high school chemistry exam, and a 40 percent on the Law School Admission Test [35].Therefore, instructors should not rely solely on ChatGPT when measuring students' creativity but instead focus on assessing students' work through hands-on activities and analysis

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