Chat GPT in Education: Applications, Impacts, and Future Prospects

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Abstract: The widespread application of intelligent chatbots (such as Chat GPT) around the world had a significant impact on education. This paper delves into the various ways in which Chat GPT is applied in education, including its role and influence in teaching assistance and personalized learning. In terms of teaching assistance, students can use Chat GPT to complete homework, and teachers can use it to design course outlines and achieve personalized teaching. However, rationally responding to the intervention of Chat GPT in the educational ecosystem has become a major challenge in the education sector. Potential risks have emerged in the educational ecosystem with the introduction of Chat GPT, such as issues with the accuracy of information and a decline in students' independent learning abilities. In response to these issues, this paper suggests a transformation in teaching methods and innovation in assessment methods in pursuit of a more innovative and efficient educational prospect.

1 INTRODUCTION

With the rapid development of artificial intelligence technology, AI-generated content technology (AIGC) has attracted widespread attention across various fields. This method utilizes artificial intelligence technology to create various types of content automatically. These contents include text, images, audio, video, music, and other forms. Through machine learning, natural language processing, computer vision, and other technologies, this technology enables computers to understand, analyze, and create content, generating products that match the described content without direct human participation. A typical example of AIGC is artificial intelligence chat software, such as Chat GPT. With their powerful natural language processing capabilities and generative dialogue technology, these software have been widely used by the public since their launch. For instance, the chatbot Chat GPT, developed by the American AI research company OpenAI team, can answer users' consecutive questions and has a memory function during the dialogue process to correct its previous content. In addition, it has functions such as translating documents, writing code, and refusing unreasonable requests. The number of Chat GPT users broke through 1 million in just 5 days, achieving the fastest-ever performance.

With the advent of Chat GPT, its outstanding performance has quickly made it one of the most powerful search engines on the market. The powerful search function enables Chat GPT to have a wide range of applications in the field of education. Chat GPT can answer students' professional questions in various disciplines and fields based on its extensive data reserves. Unlike traditional search engines such as Baidu and Google, after students pose their questions to Chat GPT, they no longer need to sift through satisfactory results from various websites as before. Chat GPT can quickly, clearly, and systematically provide detailed answers, greatly improving learning efficiency. However, the widespread use of Chat GPT has also sparked some controversies. Linguist Noam Chomsky once stated that Chat GPT is "Basically high-tech plagiarism and a way of avoiding learning"(Marshall, 2023). Its powerful text generation function has fueled student cheating, as students only need to pose their questions to Chat GPT to easily obtain answers without thinking. Chat GPT can even help students write a paper in a very short time, and it is difficult to distinguish whether these articles were completed by AI, greatly affecting teachers' judgment of students'

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actual levels. This has led many universities to ban students from using AI and to introduce many AI text detection tools. Therefore, reasonably controlling and using Chat GPT in the education sector to perfectly integrate it into educational work has become a major challenge.

This paper aims to explore in-depth the impact of Chat GPT on the education industry, analyze its current application status, potential risks, and possible educational transformations based on existing literature, and finally, the paper will look forward to the application prospects of Chat GPT in future education and how to use this technology to promote the high-quality development of education.

2 OVERVIEW OF CHAT GPT TECHNOLOGY

Chat GPT's ability to engage in natural communication with human users is primarily due to the large language model (LLM) behind it. LLM is an artificial intelligence model designed to understand and generate human language. LLM acquires a rich understanding of language patterns and knowledge by training on a vast amount of text data, enabling it to perform various natural language processing (NLP) tasks. NLP is a branch of artificial intelligence that allows computers to understand, interpret, and generate human language, thus achieving effective communication with humans in various scenarios.

2.1 Building Super Large LLMs

OpenAI believes that future general artificial intelligence should possess a task-agnostic super large LLM capable of learning various knowledge from massive data. To achieve this goal, the scale of the LLM must be enormous. GPT-3, released in 2022, has 175 billion parameters and was one of the largest language models in the world at the time. Faced with this giant model, the vast majority of users do not have the conditions to deploy or modify its parameters. Therefore, to achieve a task-oriented approach without adjusting the model's parameters, the prompt mode, rather than the fine-tuning mode, should be adopted. In simple terms, to help people complete tasks, users do not need to adjust the internal settings of the model but can provide it with some prompts or questions. Based on these prompts, the model can answer questions or complete tasks. This way, even users who do not understand the working principle of the model can communicate with it(Zhu, etal, 2023). For example, when a user asks Chat GPT about how to cook spaghetti, Chat GPT can provide detailed step-by-step instructions and even recommend different sauce options based on the user's taste preferences. This dialogue capability reflects Chat GPT's profound understanding of language and demonstrates its ability to provide personalized suggestions based on the user's specific situation. Enhancing this capability is the key to Chat GPT's successful communication with human users.

2.2 Achieving Smooth Communication with Human Users

Chat GPT could not initially communicate smoothly with human users. The successful implementation of this function mainly benefits from the injection of human preference knowledge into the GPT model. So-called "human preference knowledge" refers to the habitual language expressions of humans and the answers that humans consider good(Zhu, etal, 2023). After injecting this knowledge, GPT becomes more capable of understanding human commands and providing logical and satisfactory answers to humans. In addition, GPT has a strong autonomous learning ability. When humans inject information into GPT, they can learn the knowledge independently without human intervention. Therefore, as more users use Chat GPT, the knowledge volume in its database continues to grow, and Chat GPT can communicate more smoothly with humans.

3 CHAT GPT'S APPLICATION AND IMPACT IN THE FIELD OF EDUCATION

Based on the above research, researchers can find that Chat GPT's powerful functions lie in its ability to process and generate language and its adaptation to human preferences and autonomous learning capabilities. These technological features lay the foundation for Chat GPT's application in the field of education. In this section, researchers further explore how Chat GPT plays a role in educational practice and its potential impact on the education system.

3.1 Educational Assistance

In the teaching system, teachers face challenges such as preparing teaching materials, designing interactive sessions, and assessing student learning outcomes. As an advanced artificial intelligence technology, Chat

GPT provides new auxiliary tools for these teaching activities. First, during the lesson preparation stage, teachers can ask Chat GPT to help design course outlines and courseware or send the designed courseware to Chat GPT for polishing. After completing the courseware, teachers can use Chat GPT as a virtual student, conduct a simulated lesson for it(Huang, etal, 2021), and ask Chat GPT to raise some questions about the course to simulate student questioning and interaction. This can greatly improve the richness of the course and the efficiency of teachers' lesson preparation. In addition, teachers can use Chat GPT to generate some classroom exercises or homework assignments and assist in grading after students complete their assignments, improving work efficiency and the accuracy of homework grading(Zhou, etal, 2023).

In addition to teaching work, teachers are responsible for educating people. When teachers face some special and difficult situations, they can seek help from Chat GPT. For example, if the input to Chat GPT is: "I am a primary school teacher in Beijing, and a Tibetan student is about to transfer to our class. How can I call on students to welcome him?" Chat GPT will provide many suggestions, such as: "Organize classmates to learn about Tibetan culture and greetings," "Hold a welcome party and some fun group games to greet the new student," "Communicate with the student's parents to understand the student's situation and maintain attention." Through these measures, the new student can be helped to integrate into the class smoothly and promote internal multicultural exchange and understanding within the class. It can be seen that Chat GPT can also provide help for teachers with interpersonal skills.

3.2 Personalized Learning

After discussing the various applications of Chat GPT in teaching assistance, it can be seen that this technology greatly improves teachers' work efficiency and teaching quality. However, the core of education is not only about imparting knowledge but also about meeting the personalized learning needs of each student. Chat GPT can not only serve as a teacher's assistant but also become a partner in students' learning journey. Chat GPT's vast database and powerful search engine allow students to access professional academic knowledge at any time and place, and the learning venue is no longer confined to the classroom(Yang, etal, 2023). When students have doubts, Chat GPT can act as a teaching assistant(Khan, 2023). Its continuous dialogue mode well simulates the scenario of students asking teachers for answers, not only answering students' professional questions but also greatly saving answering time and improving learning efficiency. In addition, compared with human teachers, Chat GPT provides a pressure-free learning environment where students can ask questions freely without fear of judgment.

Moreover, Chat GPT can better fit the teaching principle of "tailoring teaching to suit the student's individual abilities"(Jiao, 2023). Different students have different cognitive levels, learning abilities, and learning methods. Chat GPT can provide personalized teaching guidance according to each student's different learning habits. For example, when learning a theory, some students are accustomed to understanding text symbols, while others are accustomed to memorizing with charts. At this time, Chat GPT can provide differentiated help to meet the needs of different students. For instance, some students with weaker learning abilities may be discouraged from learning when facing some abstract concepts due to difficulty in understanding. At this time, they can ask Chat GPT to explain the concept in more popular and practical language to better understand it. In addition, Chat GPT can also motivate students to develop their interests and hobbies. Often, students will gradually distance themselves from their hobbies due to limited cognitive levels or scarce learning resources. For example, a junior high school student is interested in astronomy but cannot approach their hobby due to limited cognitive level or scarce learning resources. At this time, Chat GPT can communicate with the student, understand the student's situation, and provide personalized resources, or recommend suitable astronomy books and materials, allowing them to approach astronomy appropriately.

4 RISKS AND CHALLENGES

Based on the above analysis, it can be seen that Chat GPT has a positive effect on educational assistance and personalized learning. However, the application of any technology comes with potential risks and challenges. Although Chat GPT has brought unprecedented convenience and possibilities to education, it may also lead to a series of problems.

Firstly, the information and answers provided by Chat GPT may not be accurate. Chat GPT's responses are usually presented in conclusive text, and its working principle is not clear to people, making it difficult to judge the accuracy of its answers. When

encountering questions involving cultural differences, complex logic, or ambiguous text, Chat GPT may give wrong answers. In the field of education, if teachers and students rely too much on Chat GPT to obtain professional knowledge and conclusions and do not discriminate and think during the learning process, it may affect learning and teaching work.

In addition, using Chat GPT to complete learning and teaching tasks can lead to a decline in logical thinking ability. For students, using Chat GPT to complete homework deprives them of the process of independent thinking. Even if students can understand the derivation process or Chat GPT's logical thinking after obtaining the answers given by Chat GPT, this understanding is still based on "understanding based on answers," and they may still be unable to solve problems independently when facing problems in the future. Teachers may lose their own teaching style if they consistently use Chat GPT for auxiliary teaching. The teaching plan templates provided by Chat GPT are generally more fixed. If teachers always teach in a template, the classroom will inevitably become boring, students' learning enthusiasm will decrease, and teachers will gradually lose their ability to reprocess knowledge(Wu, etal, 2023). For example, in physics electromagnetism, "Lenz's Law" is a relatively difficult concept to understand. When Chat GPT is asked to explain this law, it gives the answer: "The law states that the induced current will always flow in such a direction that it opposes the change in magnetic flux that produced it. " And it gave the mathematical expression. Obviously, if teachers directly explain this law to students using the definition given by Chat GPT, it will be difficult for students to understand. However, suppose teachers use the mnemonic "increase against, decrease with, come repel, go attract" to explain this law. In that case, students can quickly understand and remember the physical law reflected by this law. This kind of product based on human imagination and creativity is difficult for Chat GPT to generate, showing how important this ability to reprocess knowledge is for teachers.

5 DEVELOPMENT SUGGESTIONS AND FUTURE OUTLOOK

Although Chat GPT is a powerful educational tool, the development of technology is always a double-edged sword; it can greatly promote the modernization and personalization of education, but it may also inadvertently weaken the core values of education. To ensure that Chat GPT and other artificial intelligence tools can play a positive role in education, a series of measures need to be taken to guide their development direction and provide guidance for future educational practices.

5.1 Transformation of Teaching Methods

In traditional teaching models, teachers often focus on questions such as "Have you memorized this knowledge point?" and "Have you mastered the problem-solving routines of this type?" With the increasing capabilities of Chat GPT, these questions can be easily solved by AI, thus necessitating a transformation of traditional teaching models. In the new era, educators should focus more on the 4Cs of education − Creativity, Collaboration, Communication, and Critical Thinking−championed by many other countries(Jiao, 2023).

Although Chat GPT has powerful search capabilities, its conclusions are based on existing information summaries. Its creativity and imagination for things are far inferior to humans. Therefore, cultivating students' creativity can allow them to leverage the powerful functions of Chat GPT better to display their imagination and create innovative things. Collaboration and communication skills are equally important. On the one hand, it can enable students to learn how to make demands of Chat GPT, communicate efficiently with it, and shape it into a "service provider" tailored to their needs.

On the other hand, although students can solve most problems through Chat GPT and can find many high-quality learning resources on the internet, this has led to a significant reduction in communication between teachers and students, and discussions among students are not as frequent as before. However, when students enter society, cooperation projects and presentations of all sizes will require collaboration and communication skills, so cultivating these soft skills is essential. Critical thinking can help students improve their ability to discern information when using Chat GPT. Students should always maintain a critical attitude toward the information they obtain and not blindly accept the information provided by Chat GPT.

5.2 Innovation in Educational Assessment and Evaluation

With the transformation of teaching methods, educational assessment and evaluation methods must also be correspondingly innovated. Traditional assessment methods often focus on testing students' memory and repetition abilities, while the assessment in the new era needs to pay more attention to students' comprehensive abilities, especially the creativity, collaboration, communication, and critical thinking emphasized by the 4Cs education. This means that teachers must design more complex and diversified assessment tools to accurately measure students' progress and achievements in these areas. For example, project collaboration can be included in the assessment. By engaging students in solving problems through practical projects, this approach encourages students to explore actively, collaborate, and innovate. In the evaluation stage, report presentations and project showcases can be added to exercise students' language expression and communication skills in addition to traditional written exams.

Education aims to cultivate individuals who can think independently, communicate effectively, collaborate to solve problems, and have an innovative spirit. By combining artificial intelligence's potential and human educators' professional knowledge, researchers can look forward to a more personalized and effective educational future.

6 CONCLUSIONS

With the continuous development of artificial intelligence technology, Chat GPT, as an advanced artificial intelligence technology, has shown tremendous potential and influence in education. This paper has detailed the various ways in which Chat GPT is applied in education, as well as the possible impacts and challenges it brings. Chat GPT has brought great convenience to both students and teachers in learning and teaching. Its powerful search engine can personalize the guidance of students to meet the learning needs of different students, significantly improving the efficiency of knowledge acquisition. At the same time, it can also effectively assist teachers in their teaching work, providing services such as course design, courseware refinement, and simulated teaching, greatly improving teaching efficiency and quality. However, the development of technology is always a double-edged sword, and Chat GPT also faces some issues and risks. Sometimes, its information and answers may be inaccurate, misleading teachers and students. Moreover, over-reliance on Chat GPT may weaken students' independent learning abilities and teachers' innovative teaching capabilities. Therefore, to play a positive role for Chat GPT in the field of education, it should be used critically. Traditional teaching models and assessment methods should be innovated, and educators should focus more on cultivating students' thinking, literacy, and soft skills to ensure they use Chat GPT correctly and benefit from it.

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