Journal of Education and Educational Research
ISSN: 2957-9465 | Vol. 3, No. 3, 2023

ChatGPT's Technology Application in the Higher Education Sector, Risk Analysis and Pathway Changes

Ke Yuan

Yangtze University, Jingzhou, 434023, China

Abstract: After the emergence of ChatGPT, the role and development of artificial intelligence in the field of education has become a hot topic of discussion worldwide. Analyzing the core technical features and advantages of ChatGPT, we review and summarize the academic teaching and learning services supported by AI in four aspects: teaching content optimization, teaching process tutorial assistance, teaching method optimization, and academic paper writing, using the learning lifecycle as a framework, and look forward to 12 application scenarios combining ChatGPT's innovative technology with the higher education field. It is pointed out that the application of ChatGPT is subject to risk challenges in terms of academic integrity, privacy and information security, ethical model flaws and common sense bias, and teachers, students, higher education institutions and government departments should pay close attention to the development trend in this field, explore path changes and accelerate the deep integration of smart technologies with higher education in order to promote digital transformation and high-quality development of higher education.

Keywords: ChatGPT; Artificial Intelligence; Higher Education; Application Scenarios; Application Risks.

1. Introduction

ChatGPT, a large language model, has "exploded onto the scene" at a rapid pace, covering not only traditional human-computer dialogue, web search and information consultation, but also poetry creation, code compilation and speech writing, and has become a leader among natural language processing tools with its outstanding performance. With its excellent image, text and speech processing capabilities, many industries are expected to significantly improve their productivity with ChatGPT, establishing an intelligent computing paradigm with a large language model at its core, creating a development situation where opportunities and challenges coexist. The advantage of the language processing model represented by ChatGPT over previous technologies is the ability to accurately correct output based on user feedback and to scan internet data in an iterative manner to generate responses that mimic human language [1].

For the education sector, the creation of ChatGPT will have a direct impact on the existing education and teaching environment. With the help of technology, teachers and students are expected to cross the information divide previously formed by geographical differences and lack of technology, rapidly improve teachers' education and teaching, and enhance students' information literacy [2]. However, the easy-to-learn interaction model and low barriers to entry also make it possible for some users to use technology to circumvent the research process and use it to plagiarise the results of others, creating a crisis of trust and intellectual property rights in education that must be taken seriously. The key to turning the crisis into an opportunity in higher education is to make good use of the advantages of AI technology, to minimize its negative impact, to explore changes in the path and to lay a solid foundation for solid development in the education sector.

2. Technical Features and Advantages of ChatGPT

ChatGPT is a dialogue generation system based on Deep Learning technology, which partially solves the challenges that affect the human-computer interaction experience and meets people's long-held expectations of artificial intelligence. It uses Large Language Model (LLM), which is trained to simulate human-level language understanding and generation by feeding a large-scale text corpus, enabling a variety of applications such as text generation, machine translation and dialogue systems. ChatGPT also uses Natural Language Processing (NLP) to parse the user's input in order to better understand the user's intentions and needs; it uses the Transformer model and the Attention mechanism to process long texts and supports a variety of natural language tasks; in addition, ChatGPT also uses Reinforcement Learning with Human Feedback In addition, ChatGPT uses Reinforcement Learning from Human Feedback (RLHF) to improve the model's performance on specific tasks and a Generative Pretraining Transformer (GPT) to improve its efficiency when processing multiple tasks[3].

It is worth noting that the AI technology used in ChatGPT is not unique to OpenAI, but is based on in-depth research and integration of the original technology, resulting in an innovative product. Compared to previous AI products, ChatGPT has the advantage of stronger natural language understanding and smoother conversational capabilities, providing users with a good interactive experience. It can provide answers that are close to human language habits and ways of thinking, rather than raw textual output based on rules or templates that are difficult to identify as artificial intelligence based on text alone. At the same time, through deep learning of massive amounts of text information, ChatGPT is able to answer questions from various fields including science, history, culture and society, and combine this with an understanding of user preferences and needs to form personalized interaction solutions. In addition, ChatGPT

is able to continuously optimize its algorithms and models to continuously improve the quality and reliability of its answers, so it is foreseeable that ChatGPT will become smarter and give rise to more application scenarios in the future.

3. ChatGPT's Use of Technology in the Higher Education Sector

(i) Optimization of teaching content

ChatGPT has been used extensively in content design, which is an important precursor to teaching and learning activities. Teachers can input information about the subject area, such as historical events, scientific principles, etc., and ChatGPT can output natural, fluent text that can be used to create a course syllabus with short descriptions of each topic, on top of which knowledge can be extended and regrouped and teaching aids developed. In terms of student learning, ChatGPT can enhance learning and motivation by generating learning materials and assignments for each student that are appropriate to their learning style and subject area, using their learning history and interests.

(ii) Teaching process coaching assistance

In the teaching and learning process, understanding students' learning styles can improve the effectiveness of teaching and learning. While traditional self-administered questionnaires are used to infer individual learning styles, more recent machine learning-based approaches use multiple data sources as input, such as completed questionnaires, interaction data and student behavior data, which are then classified using feed-forward neural networks. large scale language models such as ChatGPT can be used to personalize content matching and resource provision to support teachers in the teaching and learning process. With teacher-oriented AI systems, teachers can reduce their workload by automatically assessing students' answers and providing adaptive feedback. Automatic scoring systems (AES) are one of the common AI assessment systems, ChatGPT and other large language models not only support student assessment and feedback, but can also be used to generate exercises and provide solutions.

(iii) Optimization of teaching methods

ChatGPT has been used extensively in education to change the traditional teacher-led monotonous teaching model and to promote innovative teaching methods. In higher education, ChatGPT can promote collaboration and teamwork among learners through appropriate teaching strategies. Specifically, ChatGPT can design various group games based on student-centred learning strategies to provide students with ways to solve problems and achieve goals in different scenarios, thereby increasing student engagement and interaction in learning. For collaborative writing activities, ChatGPT can help by providing style and editing suggestions as well as other integrated collaborative writing features. For international students or those who require remote tutoring, ChatGPT offers farther-reaching academic and economic potential in terms of services that transcend geographical location, teaching and time differences. At the same time, ChatGPT can be used in conjunction with speech-to-text conversion systems to assist learners with disabilities (e.g., visually impaired students) and to ensure full participation of all students. In addition, using GPT-3 as a medium of instruction to stimulate curiosity and improve questioning skills is an effective way for students to gain deeper and broader knowledge through interaction with ChatGPT, thereby increasing student motivation and learning outcomes.

(iv) Academic paper writing

In the field of education, artificial intelligence technology can enhance students' writing skills through machine learning systems that automate assessment and feedback. Using ChatGPT as a case study, the researcher guided ChatGPT to write a paper entitled 'Artificial Intelligence in Education' by logically organizing the text and adding subtitles without the need for specialist knowledge. The results showed that ChatGPT generated a coherent, accurate, rich and systematic paper [4]. ChatGPT's responses to the same question, asked in different language modes, were identical in format and had good logical coherence and information coverage. In addition, the ability of AI to write, find information and write professional texts efficiently compared to humans, thus reducing the workload of human intelligence, has the potential to change the demand in the labour market. The researchers therefore recommend that learning objectives, learning activities and assessment practices in higher education be adapted to develop students' ability to use AI appropriately, while focusing on developing creativity and critical thinking that cannot be replaced by AI.

4. ChatGPT Risk Analysis in the Higher Education Sector

While highlighting the development of technologies such as ChatGPT, we should be soberly aware that there are still risks and limitations to such technologies in the higher education sector, which may lead to a range of social problems.

(i) Academic integrity risks

The technological learning mindset and practices of artificial intelligence applications, represented by ChatGPT, which comb through and condense data to provide users with reference answers at a fraction of the time cost, can be the culprit in reducing interest in learning and limiting learning ability. If left unchecked and unavoidable over time, it can lead to a severe dependency mentality, which in turn limits students' creativity, reduces the necessary logical thinking skills and analytical discernment, amplifies fear and intimidation of learning, weakens students' sense of engagement with the learning process, and breeds a culture of laziness and academic burnout. In fact, concerns about ghostwriting and academic plagiarism have been festering with the birth and development of ChatGPT, and the spread of artificial intelligence technology has greatly increased the probability of academic misconduct [6]. There is no doubt that AI technology, as represented by ChatGPT, has great potential for development, but its development must be based on the establishment of appropriate regulations, countermeasures, risk prevention and control mechanisms, etc. If it is misused without control, AI technology will not only fail to fulfil its original purpose of facilitating human life when it was developed, but will also maim the minds and hearts of users. Students in higher education who use ChatGPT as a substitute for completing academic tests, or who submit or even publicly publish the content generated by ChatGPT as their own learning outcomes, are committing acts of dishonesty or academic misconduct, which not only interfere with the accuracy of their learning assessment, but also hinder their personal and even national development. In the field of education, technological tools, as auxiliary tools to enhance the quality of education, must not be allowed to grow wildly. Before allowing students to use them,

operational norms should be constructed for their use, and students should be guided to use artificial intelligence scientifically, not only not to waste food because of choking, but also to uphold a principled, bottom-line and controlled approach to things, so as to grasp the development opportunities brought about by artificial intelligence without destroying the original education mechanism, and to promote Artificial intelligence plays a positive educational role[7] .

(ii) Privacy and information security risks

ChatGPT's training data is usually sourced from public datasets and textual content on the Internet, which may contain sensitive information such as personal identity, preferences, communication records, etc. There is a risk that ChatGPT may leak or spread other people's privacy by failing to identify them in the process of mining and integrating data for users; at the same time, in order to grasp students' academic level, interests, study habits, etc. and improve the efficiency and reliability of assisting students' At the same time, ChatGPT will also collect a lot of private information from users in order to grasp students' academic level, interests, study habits, etc., and improve the efficiency and reliability of assisting students in learning, thus creating the risk of leakage or theft of users' privacy. If the deep integration of AI and education is realized in the future, a large number of ChatGPT-type intelligent products with commercial value and low threshold of use will emerge, and learners' privacy and information security will face even more serious challenges [8]. Compared to students in basic education, students in higher education have to manage more personal information themselves, and the nature of information is more sensitive, complex and fragmented. At the same time, the industry or academic information that tertiary students are exposed to may have confidentiality requirements, and the copyright of their assignments, papers and other results formed using smart platforms is still up for debate, hence the need for higher data security and privacy protection.

(iii) Deficiencies in ethical models and risk of common-sense bias

The current version of ChatGPT is still essentially a tool that relies heavily on training data to calculate, so there are many technical vulnerabilities. For one, due to the paucity of training data, the backend database is only updated to 2021, which provides insufficient support for hot events in the past two years. As a result, the conclusions drawn by ChatGPT deviate from the latest industry trends and current hotspots, and its views are only used as an auxiliary reference and not as key supporting materials. Secondly, when indexing articles and referencing information, ChatGPT may create some non-existent authors or articles to quote its own views, resulting in some users who are not technologically savvy to cite the wrong views, and there is no effective system to identify the authenticity of the articles cited by ChatGPT. Thirdly, there are a few factual errors, knowledge blind spots and common-sense biases in the human-computer dialogue. As a result of these three points, ChatGPT often misleads users when it comes to education, causing them to misjudge the current form of education and the current state of education, which in turn leads to poor teaching decisions. In addition to common sense biases, ChatGPT in education also requires a focus on ethical risks. ChatGPT has a built-in ethical model from its inception, so if it detects a statement that is illegal or deviates from public order and morality, it will be judged by the ethical model as a malicious issue and the AI application will either remain silent or provide a good-faith admonition. In practice, however, ChatGPT's pre-defined ethics model is flawed, and some users may be able to bypass the ethics model by changing the question from "what" to "what should I do if I want to avoid something". This is a serious breach of the ethical model's original intent. This is a serious breach of the ethical model's original intent, and could expose some uninitiated students to the risk of being influenced to organize and participate in illegal behavior by exploiting the flaws in ChatGPT's logic [9].

5. ChatGPT Pathway Change Study in Higher Education

With large-scale language models such as ChatGPT, artificial intelligence is having a growing impact on the higher education sector. Teachers, students, higher education institutions and policy authorities should closely follow the trends in this field and adapt their learning, teaching and assessment methods in order to promote high quality higher education and adapt to the needs of the current times. [10]

(i)Teachers in higher education: transforming assessment and developing critical thinking

Teachers in higher education should reduce and avoid the risk of students over-relying on large text-based tools such as ChatGPT to complete coursework or exams. To do this, teachers need to shift their assessment methods to avoid formulaic exams and assignments, emphasize breadth and depth of knowledge, and design writing analysis tasks such as images, videos and class discussions that ChatGPT does not excel at. In addition, teachers can ask students to integrate their personal experiences and perspectives into their writing by analyzing longer texts that do not lend themselves to prompts and those that are not yet included in the latest topical events. Teachers should incorporate artificial intelligence tools such as ChatGPT into their teaching to develop students' creative and critical thinking skills and to guide them in understanding the strengths and weaknesses of artificial intelligence.

(ii)Students in higher education: building ethical awareness and mastering emerging technological tools

Students at the tertiary level are more proficient in using emerging technologies such as ChatGPT than teachers, making it even more important for university students to be able to: firstly, familiarize themselves with academic integrity norms and the consequences of misconduct; secondly, become digitally literate and master the use of AI tools to improve their academic skills; thirdly, see AI tools as a way to improve their writing skills and generate new ideas when using them; and Fourth, be wary of substandard sources, errors and disinformation; fifth, read widely to improve critical and creative thinking; and sixth, learn to write and debug code using AI language tools and practice using AI tools to solve real-world problems.

(iii)Higher education institutions: responding positively to new technologies and ensuring appropriate use

Higher education institutions have been slow to respond to new technologies compared to their acceptance by students and faculty, with institutions consistently oscillating between the extremes of banning their use and incorporating them into the curriculum. In the long term, higher education institutions should not see this as a simple crisis or challenge, but rather as a possibility to respond positively to new technologies and focus on how to succeed beyond their limitations in machine learning while maintaining academic integrity and using AI

as a resource for innovation and building a good relationship of trust with student-centred teaching models. To this end, digital literacy education should be promoted, relevant research should be encouraged and supported, the necessary curriculum should be developed, faculty training should be enhanced, and lectures or courses on academic integrity should be offered to students. At the same time, update academic integrity policies and honour codes, and develop clear and understandable guidelines to ensure the appropriate use of AI tools.

(iv) Government sector: strengthening policy guidance and coordinating technological development and social responsibility

To promote the use of large-scale language models such as ChatGPT in education, policymakers should think ahead to effectively address new challenges, developments and larger ethical issues in education and technology. Firstly, the government can regulate the development and use of AI educational tools and strengthen regulation by formulating relevant policies and regulations; secondly, the government can increase investment in AI education and encourage enterprises and institutions to develop and apply AI educational tools, while establishing corresponding regulatory mechanisms to combine the development and application of models with human supervision, guidance and critical thinking to achieve a balance between technological development and social responsibility; finally, the government can also increase the popularity of AI education through publicity and training, guide students and teachers to use AI education tools correctly, and guarantee the quality and safety of AI education.

References

[1] ZHAI X. ChatGPT for Next Generation Science Learning [J]. XRDS: Crossroads,The ACM Magazine for Students, 2023, 29 (3):42-46.

[2] RAHMAN Md M,WATANOBE Y. ChatGPT for Education and Research: Opportunities, Threats, and Strategies [J]. Applied Sciences, 2023,13(9):5783.

[3] Shen Shusheng, Zhu Zhiting. ChatGPT-type products: the inherent mechanism and its impact on learning evaluation [J]. Chinese Distance Education, 2023(4):8-15.

[4] FOLTYNEK T,MEUSCHKE N,GIPP B.Academic plagiarism detection:A systematic literature review[J].ACM Computing Surveys (CSUR),2019,52(6):1 -42.

[5] BENABBOU F. A new online plagiarism detection system based on deep learning [J]. International Journal of Advanced Computer Science and Applications,2020,11(9):470-478.

[6] Cui Yuhong, Bai Fan, Zhang Ruixin. The application, risks and responses of ChatGPT in the field of higher education [J/OL]. Journal of Chongqing University of Technology (Social Sciences): 1-17 [2023-05-19].

[7] KASNECI E, SESSLER K, KÜCHEMANN S, et al. ChatGPT for good? On opportunities and challenges of large language models for education [J]. Learning and Individual Differences, 2023, 103:102274.

[8] Guo Xuehui. Challenges and Responses to Personal Information Security in the Era of Artificial Intelligence [J]. Journal of Zhejiang University (Humanities and Social Sciences Edition), 2021(5): 157-169.

[9] ADIGUZEL T,KAYA M H,CANSU F K.Revolutionizing education with AI: Exploring the transformative potential of ChatGPT [J].Contemporary Educational Technology, 2023, 15 (3): ep429.

[10] Zhou Hongyu, Li Yuyang.The impact of ChatGPT on education ecology and coping strategies [J]. Journal of Xinjiang Normal University (Philosophy and Social Science Edition), 2023 (4): 102-112.