

Study of the Effect of ChatGpt on the Development of Research Capacity of Higher Education Students

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Abstract. As a relatively mature generative AI technology, ChatGPT's application in education and scientific research has attracted wide attention. This paper investigates the current situation of ChatGPT use among college students and the impact of ChatGPT on their scientific research capabilities and analyzes that the current application effect of ChatGPT in learning is relatively positive, but there are still problems such as inaccurate and insufficient quality of the generated text. At the same time, ChatGPT is of great help to college students in terms of perception ability, language comprehension ability, language expression ability, data collection ability, and knowledge construction ability, but it is not significantly helpful for the improvement of students' teamwork ability, problem discovery ability, innovative thinking ability, and innovative practice ability. Given the current problems in the use of ChatGPT and the challenges it brings to the development of students' scientific research ability, this article provides corresponding countermeasures and suggestions from multiple perspectives.

Keywords: ChatGPT, scientific research ability, college students.

1. Introduction

ChatGPT, as a mature generative artificial intelligence technology, has sparked a craze among college students. Its personalized assisted learning, information processing, interactive experience, and other functions are highly favored by college students. In terms of scientific research, some university students have gradually started to rely on ChatGPT. However, currently, universities in countries such as the United States, Australia, the United Kingdom, and France have issued notices restricting the use of ChatGPT in academic studies, especially in academic papers and research. One of the top universities in France, the Paris School of Political Science, prohibits the use of ChatGPT to prevent fraud and plagiarism. Whether the research ability of college students will change due to the application of ChatGPT has become an unavoidable issue in current research. Currently, ChatGPT is still highly controversial and is considered a double-edged sword in many fields. Although there have been studies focusing on the application of ChatGPT in the field of education, there is a research gap in its impact on the research ability of university students. Existing research lacks an in-depth analysis of how ChatGPT affects students' research thinking, methods, and behaviors, as well as specific applications and impacts in different disciplinary fields and research stages. Through research, it can better assist university students in utilizing ChatGPT as a tool for scientific research and also enable the country and universities to formulate corresponding policies to avoid the negative impact of ChatGPT. For college students, their research ability is influenced by both personal qualities and external factors such as ChatGPT. The correct use of ChatGPT can effectively help further research, but incorrect use of ChatGPT can lead to academic fraud, plagiarism, and other misconduct.

This study focuses on ChatGPT and research ability and collects data on the impact of ChatGPT on the research ability of university students through questionnaire surveys. And, the raw data will be processed and transformed into a straightforward scale form to analyze and study the impact of ChatGPT on the research ability of college students.

2. Method

2.1. Research Object

At present, the application of AI technology in the field of education has been widely studied, and the potential of ChatGPT is particularly noteworthy. Scholars have explored the applications of ChatGPT in assisted teaching, intelligent question answering, and automatic evaluation, and have achieved some results. However, research on how ChatGPT affects the research ability of university students is still relatively limited, mainly focusing on its auxiliary tool functions, lacking exploration of its deep impact [1, 2].

This study mainly focuses on college students who are using artificial intelligence language models such as ChatGPT for scientific research activities. To ensure the representativeness and breadth of the study, 225 undergraduate and graduate students from different universities, disciplines, and grades were selected from multiple universities across the country as research samples. These students have used ChatGPT for research activities at least in the past year, including but not limited to searching for academic materials, writing research papers, or participating in research projects. The research aims to gain a deeper understanding of how ChatGPT affects the research abilities of university students through this survey, including its applications and potential impacts in information retrieval, literature review, and paper writing.

2.2. Questionnaire Design

This study aims to design a questionnaire on the impact of ChatGPT on the research ability of college students, which consists of two parts. The first part is adapted from the questionnaire developed by Ding Pengna et al, used to collect information on the current use of ChatGPT by university students, including basic information, level of understanding of ChatGPT, and usage [3]. The second part of the questionnaire focuses on evaluating the impact of ChatGPT on the research ability of university students. Based on existing literature, research ability is divided into fourteen dimensions, such as perception ability, language comprehension ability, and language expression ability. This questionnaire design follows the principles of scientificity and practicality, using the Likert scale (ranging from 1 "completely disagree" to 5 "completely agree") to evaluate the self-awareness of college students in different research abilities, such as basic ability, practical ability, innovation ability, etc., to ensure the comprehensiveness and accuracy of the data.

2.3. Data Collection and Analysis

Through the online distribution of questionnaires, a total of 225 questionnaires were collected. After removing invalid data, 219 valid questionnaires were obtained with a response rate of 97.33%. The data was subjected to descriptive statistical analysis using SPSS software to gain a deeper understanding of the current status of ChatGPT usage among university students and its impact on their research abilities. Regarding the current status of ChatGPT usage among college students, there is a high usage and popularity rate of ChatGPT among college students, but there is still room for improvement. Overall, the application effect of ChatGPT in learning is relatively positive, especially in terms of information search, knowledge explanation, and writing guidance. However, the current text output still faces issues of unstable quality, insufficient security, and privacy. Regarding the impact of ChatGPT on the research ability of college students, it has a significant impact on improving their comprehension, language comprehension, language expression, data collection, data processing, and knowledge construction abilities in scientific research; However, there is no significant improvement in students' teamwork ability, problem-solving ability, innovative thinking ability, and innovative practical ability.

3. Result and Discussion

3.1. The Help of ChatGPT in Improving the Scientific Research Ability of College Students

3.1.1. In terms of thinking

College students using ChatGPT for repeated and in-depth questioning can obtain more unthinking information, thereby inspiring their thinking. The survey questionnaire shows that 72.1% of college students believe that ChatGPT will help them better perceive things. Over time, students will develop the habit of critical thinking, accumulate more new knowledge, and enhance their ability to comprehend. In addition, ChatGPT can reorganize and organize knowledge through its personalized tutoring, making knowledge systematic and organized, and constructing a knowledge system. 74% of college students believe that ChatGTP can better assist them in knowledge construction and improve their knowledge construction abilities. In summary, the vast majority of university students believe that ChatGPT is of great help to their thinking ability and can help them better engage in scientific research practice.

3.1.2. In terms of language

Most college students use ChatGPT for text-based conversations. ChatGPT can accurately understand complex sentences that students cannot understand in scientific research and provide straightforward answers. The results show that 73.5% of college students agree that ChatGPT can help them read and understand better. Long-term conversations with ChatGPT are beneficial for students to improve their language comprehension abilities. Moreover, when college students use ChatGPT for conversations, ChatGPT's answers are usually impeccable, with accurate language expression and frequent use of official scientific terminology. College students will be influenced by the language expression of ChatGPT to improve their language expression ability. 74.9% of college students feel that ChatGPT has greatly benefited them in organizing language and expression. It is not difficult to see that ChatGPT can better assist college students in understanding and expressing themselves in language, enabling them to have a deeper understanding and more accurate expression of texts.

3.1.3. In terms of information

Relying on ChatGPT's powerful big data, ChatGPT has strong data collection capabilities and can quickly find any information that students need. If necessary, ChatGPT can also indicate the source of the collected data. This greatly improves the ability of college students to collect information, enabling them to collect scientific research materials more efficiently. The survey results indicate that 76.1% of university students believe that ChatGPT will help them better collect relevant scientific research data. The speed and scope of data collection are accelerated, which is very beneficial for student scientific research. In addition, ChatGPT has powerful information processing technology that can perform secondary processing on the information collected by college students. It can classify and process data to improve the data processing ability of college students. The data also shows that 79% of students agree that ChatGPT can help them better process scientific research data. The powerful functions of ChatGPT in data collection and processing can enhance students' ability to conduct scientific research more efficiently and comprehensively.

3.2. The Shortcomings and Challenges of ChatGPT in Improving the Scientific Research Ability of College Students

3.2.1. The inherent risks of protecting academic integrity and privacy security

The primary concern for college students during the use of ChatGPT is the potential risks to academic integrity and privacy security. Through the collection and organization of questionnaires, nearly 30% of respondents believe that the potential of ChatGPT in the field of education is not optimistic, and point out various prominent issues in the use process. Due to ChatGPT's content generation based on training data, students are unable to fully control its output, which can directly

lead to inaccurate content or inconsistency with research objectives, thereby affecting the accuracy and reliability of research results and even damaging academic integrity. Secondly, the use of ChatGPT involves data privacy breaches and network security threats, such as the collection of private information for model training, as well as the possibility of being used for network attacks or fraudulent behavior, which increases the risks in the scientific research process.

3.2.2. Limitations of enhancing personal learning and innovative development abilities

Although ChatGPT can provide a wide range of learning resources and answer questions, there are still certain limitations in enhancing personal learning and innovative development abilities. In this survey, nearly 29% of college students hold a skeptical and negative attitude that the use of ChatGPT is beneficial for improving their personal self-learning ability and innovative thinking ability. This indicates that ChatGPT has a relative lag in solving cutting-edge and novel problems based on existing data and algorithms. In the rapidly developing field of knowledge, this lag means that students are unable to access the latest knowledge and perspectives promptly, thereby limiting their ability to innovate. It also reflects that ChatGPT has strong professional and in-depth subject knowledge, and the accuracy and detail of its answers often fail to meet the expectations of all students. In specific fields of learning, a profound academic background and professional knowledge are often required, and ChatGPT, as a universal artificial intelligence tool, makes it difficult to cover the details and depth of all professional fields. Therefore, while using ChatGPT to assist learning, students still need to focus on cultivating sharp observation and analytical abilities. Be wary of excessive reliance on ChatGPT and the resulting weakening of self-directed learning and innovative thinking abilities.

3.2.3. Shortcomings in cultivating teamwork and practical skills

The limitations of ChatGPT in cultivating team collaboration and practical skills are particularly significant. According to survey data, more than one-third of college students do not agree that the use of ChatGPT can enhance the effectiveness of team collaboration and help them better innovate and practice. In the process of solving real-world problems, it is not only necessary to be targeted and accurate, but also to master flexibility. From this, it can be seen that the core problem for some university students when using ChatGPT is that ChatGPT cannot truly integrate and participate in actual team collaboration tasks, let alone perform actual operations. Compared to the team collaboration of students themselves, ChatGPT cannot understand complex team collaboration tasks and is even more unable to engage in deep communication, coordination, and collaboration independently like humans. In addition, although ChatGPT can answer questions in a short period, it cannot replace learners in long-term, systematic learning and practice. Only through long-term learning and practice, and through practical operations to deepen their understanding and mastery of knowledge, can students truly transform the knowledge they have learned into practical abilities, thereby effectively improving their practical abilities. Therefore, students need to focus on cultivating their practical abilities, combining theoretical knowledge with practice, to better grasp and apply the knowledge they have learned.

4. Countermeasures and Suggestions

4.1. Formulate Relevant Policies and Strengthen Scientific Research Supervision and Guidance

From the perspective of universities, corresponding policies should be introduced specifically for the use of ChatGPT. In this way, the permissible scope and manner of its usage could be defined clearly, and any behavior that exceeds these regulations could be punished severely. Meanwhile, it should enhance the supervision of ChatGPT for students [4]. Students are permitted to use ChatGPT for academic purposes within a reasonable range. Otherwise, any use beyond a reasonable limit should be imposed penalties accordingly. Universities should take measures to monitor every stage of scientific research to prevent students' overreliance on tools like ChatGPT [5]. In addition, from

the perspective of teachers, scientific research mentors should strictly perform their duties of supervising students' use of ChatGPT. When students over-rely on ChatGPT or exceed the prescribed scope of use, the mentors should promptly detect and stop any excessive reliance or unauthorized use. Those who refuse to correct serious circumstances should be referred to the university for handling.

4.2. Improve the Quality of Generated Text and Optimize the Dialogue Format

From the perspective of ChatGPT itself, the current issues of unstable text generation quality and content deviation still need to be addressed [6]. In this regard, it is highly recommended that further improvements be made to ensure the quality of output content and satisfy the research needs of university students. Additionally, the current dialogue format of ChatGPT tends to cause excessive reliance and a fixed mindset among students. Therefore, it is suggested that ChatGPT can improve the quality of generated texts through algorithm adjustments and optimize the dialogue format, such as providing information to users without directly providing direct answers.

4.3. Rational Use to Improve Self-Innovative Thinking and Scientific Research Capabilities

From the perspective of university student groups, there are some concerns about overreliance on ChatGPT's provided ideas and fixed mindset during the process of their scientific research activities. However, students should avoid relying excessively on artificial intelligence, as it could block the further development of scientific research ability [7]. Instead, students should maintain their critical thinking and creativity and regard ChatGPT as a learning tool. They should use it rationally, leveraging its valuable information to improve their innovative thinking and scientific research capabilities.

5. Conclusion

Since its development, ChatGPT has had a profound impact on university students. At present, ChatGPT has a high usage rate and recognition among university students, and it also boasts a positive application effect in learning, especially in areas such as materials searching, knowledge explanation, and writing assistance. However, surveys have revealed that ChatGPT still faces problems like inaccurate and insufficient quality in its text generation. At the same time, ChatGPT has been immensely beneficial in enhancing students' various capabilities in areas such as perception, language comprehension, language expression, information gathering, information processing, and knowledge construction. Nonetheless, its impact on improving students' teamwork, problem-finding, innovative thinking, and innovative practice capabilities is relatively insufficient. To tackle the challenges identified in the research, universities, ChatGPT itself, and students must all engage actively and contribute effectively.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

References

- [1] Gu M Y. Dictionary of education. Shanghai: Shanghai Education Press, 1991: 45.
- [2] Wei S, Li L Y. Research on Artificial Intelligence assisted second language writing feedback: Taking ChatGPT as an example. *Chinese Foreign Languages*, 2023, 20 (03): 33 - 40.
- [3] Ding P N, Zhan Y Y. Exploring the use and influencing factors of ChatGPT among college students: based on the technology acceptance model. *News Knowledge*, 2023, (12): 65 - 73+89.
- [4] Cotton D R E, Cotton P A, Shipway J R. Chatting and cheating: Ensuring academic integrity in the era of ChatGPT. *Innovations in education and teaching international*, 2024, 61 (2): 228 - 239.

- [5] Guo Q, Feng R L, Hua Y F. The application and potential problems of ChatGPT in English academic paper writing and teaching. *Foreign Language Electronic Teaching*, 2023, (02): 18 - 23+107.
- [6] Grassini S. Shaping the future of education: Exploring the potential and consequences of AI and ChatGPT in educational settings. *Education Science*, 2023, 13, 692.
- [7] Gutierrez-Aguilar O, Huarsaya-Rodriguez E, Duche-Pérez A. The mediating effect of academic performance on ChatGPT satisfaction in university students. XVIII Multidisciplinary International Congress on Science and Technology. Cham: Springer Nature Switzerland, 2023: 353 - 365.