

The Role of Generative AI in The Process of Autonomous Learning of College Students

Jiayin Liu *

School of Foreign Languages, Taizhou University, Taizhou, Zhejiang, 318000, China

* Corresponding Author Email: suff.ovo@gmail.com

Abstract. It is more and more common for college students to use generative AI for autonomous learning in the background of the Digital Era. The impact of AI on autonomous learning has been widely considered, but the research on the impact of generative AI on college students' autonomous learning ability is still insufficient. This paper analyzes the role, positive influences, and disadvantages of generative AI used by college students in the process of autonomous learning. After analysis, it is proven that generative AI can not only improve the efficiency of self-learning of college students, but also have an impact on the advanced thinking ability of college students. Based on this, this paper suggests that college students should improve their self-discipline under the guidance of teachers, and improve the autonomous learning framework with the help of generative AI in combination with their actual situation. And finally, the ability of lifelong learning is cultivated.

Keywords: AI; college students; autonomous learning; thinking ability.

1. Introduction

With the rise of information technology and the development of the digital era, AI tools are gradually becoming popular. In this context, the field of education is facing the challenge of digital transformation. College students wanting to develop individual and social development, self-learning ability is inevitable, and the related training has also become the focus of university teaching reform [1]. Generative AI has gradually entered the field of education and has a great influence. Its excellent ability to generate text attracts more and more college students to choose the choice of using this AI for autonomous learning. There are various types of artificial intelligence, and the research of Wang Han and some other scholars has also proven that artificial intelligence tools can promote and further enhance the subsequent learning outcomes of college students in the comprehensive learning process [2, 3]. However, the role of generative AI in the process of autonomous learning among college students is still unclear, and its impact is unknown. Further exploration is needed to explore the role of generative AI in autonomous learning among college students in the context of the digital age, to better guide their learning, enhance their learning abilities, cultivate advanced cognitive thinking, and achieve the goal of lifelong learning. This article mainly explores the role and classification of generative AI in the autonomous learning process of college students, to analyze the role and usage scenarios of artificial intelligence in the autonomous learning process of college students.

2. The Characteristics of Autonomous Learning in the Context of the Digital Age

2.1. Autonomous Learning Presents more Initiative

The rapid development of digitization has enriched learning methods and reduced the limitations of learning environments. College students need to exert their initiative in self-directed learning [4]. In the digital age, more universities focus on cultivating students' digital literacy and self-learning ability. Generative AI can enhance the learning methods and interests of college students in the process of self-directed learning, and provide necessary assistance in summarizing, summarizing, and organizing. It reduces the obstacles for college students to search for relevant learning materials and understand complex literature in the process of self-directed learning, and can generate personalized

content suitable for college students, further stimulating their motivation and interest in self-directed learning [5]. The motivation for self-directed learning ability mainly comes from four aspects: external motivation, internal motivation, self-efficacy, and exam anxiety [6]. Generative AI, as an emerging phenomenon, provides external motivation. When college students use generative artificial intelligence for self-directed learning, they will feel a sense of novelty and face the challenge of how to better assist self-directed learning with generative AI, which stimulates their desire for self-directed learning and improves their ability to learn independently.

2.2. Autonomous Learning Presents Resource Diversification

The gradual digitization of life has provided more resources for college students to learn independently. Generative AI has powerful text output capabilities, which can search for books, journals, news media, various encyclopedias, and content published by netizens through the Internet, and generate text using big language models. It can help college students in text retrieval, understanding the general idea, and other aspects. Using generative AI for text search results presents diversity. At the same time, the use of generative artificial intelligence has increased the channels for college students to access resources for self-directed learning, and also facilitated the collection and organization of various materials for college students during self-directed learning. According to the self-directed learning ability assessment system, resource management strategies are also an important testing method [6]. As the form of generative artificial intelligence is continuously strengthened through training, the ability to generate text retrieval is also gradually enhanced. At the same time, the use of generative AI in the autonomous learning process of college students has retrieved a large number of reference resources for them, posing new challenges to the management of their resources.

2.3. Less Guidance for Autonomous Learning

In the digital age, there is an information explosion, and with the help of generative AI, relevant information can be obtained more widely. College students have strong personalization in self-directed learning. When using generative AI, if the prompt words used are inappropriate or ambiguous, it will result in inaccurate results that are inconsistent with the ideas that college students need, and the efficiency of self-directed learning will be greatly reduced. Before receiving relevant training on prompt word literacy, college students need to receive appropriate guidance to achieve personalized improvement in prompt word literacy [7]. If generative artificial intelligence references literature with erroneous research results when outputting text, its generated results will also produce errors. Sometimes, when college students use generative AI in their autonomous learning process, they may not have a clear understanding of the results, may not have a thorough grasp of the required content, and may feel confused when choosing to use the generated text. When college students engage in autonomous learning, by combining the research topics and teaching tasks of self-directed learning, providing appropriate guidance on generative AI can improve the efficiency of its utilization and optimize the effectiveness of autonomous learning. College students should also review their use of generative AI promptly to achieve sustainable and effective autonomous learning.

3. The Drawbacks of Generative AI in College Students' Self-Directed Learning

3.1. Limitations on Autonomous Learning

During the process of self-directed learning, college students can use generative AI to help them gain a preliminary understanding and summarize the main idea of the article, to facilitate their understanding and further thinking on the learning content in the subsequent self-directed learning process. However, the text generated by generative AI is limited by prompt words, and the content of the produced text will also be subject to certain restrictions. Partial generative AI (such as ChatGPT

and Sora) may encounter rare situations during large-scale corpus training, resulting in comprehension bias or even inability to understand [8]. Moreover, due to the incomplete training level of generative artificial intelligence, there may be inaccurate or even erroneous results provided, which can mislead college students and lead to misconceptions and biases. Moreover, the fast text generation speed of generative AI in question answering makes it difficult for college students to engage in spontaneous deep thinking and research based solely on the answers provided by generative artificial intelligence, which limits the formation of knowledge concepts in autonomous learning and deprives them of motivation for further learning. Partial generative AI, when the prompt words are not completely accurate, can lead to overly uniform and patterned generation results, a lack of diversity and innovation, and also limit the thinking of college students during autonomous learning, making it difficult to cultivate innovative thinking.

3.2. Formation of Thinking Inertia

Generative AI provides various conveniences for college students to search, organize, summarize, and integrate literature in the process of self-directed learning, making the process of self-directed learning easier for college students. But there is also a phenomenon of college students abusing generative AI for self-directed learning. Due to the excellent text summarization ability of generative AI, some college students have the phenomenon of excessive use of generative AI, resulting in dependence on the use of generative AI, leading to thinking laziness and laziness. The formation of cognitive inertia can lead to a decline in higher-order cognitive levels among college students during the process of self-directed learning, fixed thinking, weakened innovation ability, decreased learning efficiency, and a negative impact on self-directed learning [9]. When college students ask questions about generative AI, the results provided by generative AI are often fast and can be given without deep thinking, which can easily lead to shallow learning depth and inability to fully construct knowledge frameworks, resulting in insufficient understanding of knowledge points and degradation of learning ability.

3.3. Potential Ethical Issues

When using generative AI for text generation, due to referencing various literature in the database, it may unintentionally use the research results of other scholars. The text output by generative AI is original, and if college students use the generated text directly for self-directed learning, there will be controversy over academic misconduct. Moreover, generative AI based on big language models, as a task-oriented model, can simulate human-machine communication and may generate incorrect results based on the user's preferences, thereby misleading college students to absorb incorrect knowledge points in self-directed learning [10].

4. Suggestions for College Students to Use Generative AI to Optimize Autonomous Learning

4.1. Cultivation of Innovation

Generative AI can assist college students in their self-directed learning process, allowing them to allocate more time to deep thinking; However, the powerful capabilities of generative AI can also easily lead college students to become dependent on it during self-directed learning, resulting in potential risks of a decline in their higher-order cognitive skills, seriously endangering college students' self-directed learning and affecting their lifelong learning ability [9]. Moreover, due to individual differences, college students' acceptance and application of generative AI vary [11]. Therefore, it is necessary for college students to strengthen their self-learning ability and innovation awareness, and master the methods of cleverly utilizing generative AI to achieve better results in self-learning. And sometimes college students can cultivate critical thinking when using generative AI, and treating generated text correctly improves their thinking level [12]. However, the integration of

generative AI into life is an inevitable development direction, and it will be interwoven into various fields of real life with the development of technology. College students who cultivate their innovation and skillfully utilize generative AI for self-directed learning can lay a solid foundation for lifelong learning in the future.

4.2. Teachers Provide Certain Guidance

Due to differences in psychological characteristics and cognitive levels between college students and primary and secondary school students or other adults, their self-directed learning methods are also different from those of primary and secondary school students or other adults [13]. Related studies have shown that college students who use artificial intelligence to construct a framework suitable for the characteristics of subject courses and engage in self-directed learning perform better in homework and exams compared to students who use traditional learning methods, reflecting the improvement of teaching effectiveness with the assistance of artificial intelligence [14]. Teachers can provide some advice to college students who use generative artificial intelligence for self-directed learning, helping them improve their digital proficiency. Teachers can also collaborate with generative AI to assist in evaluating the learning status of college students and help them understand their true situation. Using generative AI to perform quality checks on learning outcomes after completing phased learning tasks, reminding and monitoring self-directed learning through data acquisition.

4.3. Improvement of Self-Discipline

College students should strengthen their self-discipline and adhere to regular feedback on their self-directed learning framework after achieving the goals at each stage, to assess their learning outcomes at each stage. College students should enhance their awareness of information discrimination when using generative AI, pay attention to the accuracy of generated text, ensure the effectiveness of research content, improve learning efficiency, and better absorb knowledge points. In addition, students should pay attention to strengthening self-discipline and not use generative AI to directly output research results, to prevent the degradation of thinking ability. College students should also adjust their algorithms promptly when providing feedback, or use pre-debugged generative artificial intelligence to evaluate their learning outcomes.

5. Conclusion

The use of generative AI can provide many conveniences for college students in the process of self-directed learning, helping them save time in literature review and summarization. However, excessive reliance on generative AI to output intuitive results can harm college students' higher-order thinking abilities, form lazy thinking, reduce the efficiency of self-directed learning, and go against the purpose of learning. However, under the guidance of teachers, college students can skillfully utilize generative artificial intelligence for efficient self-directed learning by cultivating their innovation and enhancing their self-discipline, gradually developing the ability for lifelong learning.

References

- [1] Ouyang Y, Zhang C. Research on interactive mechanisms and strategies of college students' autonomous learning under the guidance of education digitization. *The Guide of Science & Education*, 2024, (21): 53-56.
- [2] Wang H, Tong Y. Artificial Intelligence: a new opportunity for college students to study independently and efficiently. *Journal of Qilu Normal University*, 2020, 35(06): 15-21.
- [3] Ye Z, Sun L. Analysis of the current situation and enhancement strategies of Artificial Intelligence-empowered college students' English self-learning. *Overseas English*, 2023, (08): 124-127+134.

- [4] Fang Y. Research on college student self-regulated learning mode construction supported by digital learning resources. Northeast Normal University, 2011.
- [5] Chu H. Digital transformation of English learning in vocational colleges based on generative Artificial Intelligence. *Journal of Nanjing Open University* 2024, (04): 59-63.
- [6] Guo W, Lau K. Constructing key competencies: From the perspective of self-regulated learning. *Global Education*, 2017, 46(03): 16-28.
- [7] Zhang G, Jia J. Research on prompt literacy cultivation in the era of generative AI. *Journal of Academic Libraries*, 2024, 42(06): 63-71.
- [8] Tao X. From ChatGPT to Sora: Opportunities and challenges of foreign language teaching in the background of digital transformation. *Language And Education Studies*, 2024, 8(02): 5-11.
- [9] Wang D, Liu Y, Jing X, Liu Q, Lu Q. Catalyst for future education: An empirical study on the impact of artificial intelligence generated content on college students' innovation ability and autonomous learning. *Education and Information Technologies*, 2024, 1-20.
- [10] Zou T, Xiong Q. The risks of academic misconduct in the use of generative Artificial Intelligence and its governance. *Journal of University of Jinan(Social Science Edition)*, 2024, (06): 163-167.
- [11] He L, Ying Z, Wang Y, Sun W. ChatGPT in education: A diagnostic study of teaching ability. *Journal of East China Normal University Educational Sciences*, 2023, (07): 162-176.
- [12] Qi J, Xu Y, Liu J, Xue K. The impact of generative Artificial Intelligence tools on college students' critical thinking and autonomous learning ability. *e-Education Research*, 2024, 45(12): 67-74.
- [13] Chen T, Ma Z, Zhang Y, She L, Guo B, Yang F. Construction of a self-directed learning model for basic chemistry assisted with Artificial Intelligence technology. *Medical Education Research and Practice*, 2025, (01): 49-54.
- [14] Zheng H. Research on the cultivation and evaluation of college students' autonomous learning ability. *Chinese Vocational and Technical Education*, 2016, (13): 66-70.