



Generative AI on the General Innovation Skill of High School Students in School

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Abstract. This article mainly explores the impact of generative AI on students' ability to innovate in school. With the development of artificial intelligence technology, generative AI has been widely popularized and used. In schools, generative AI is often used to assist students in completing their schoolwork. However, due to the systemic factors of generative AI, the academic projects it participates in generally face doubts about originality and authenticity. Therefore, this paper intends to study the impact of generative AI on students' comprehensive abilities to further understand the value and challenges of generative AI and find reasonable ways to use it. This paper adopts the method of systematic literature review. At present, the expected conclusion is that the impact of AI on students' comprehensive performance is directly proportional to students' own learning attitude. The retrieval function of generative AI has a certain positive impact on students' comprehensive ability. The conclusions of the study show that students should be educated to use generative AI, such as using AI to provide ideas, available resources, websites, etc., to identify the authenticity of information and avoid over-reliance on it.

Keywords: High School, Generative AI, Education.

1 Introduction

Since 2024, the development of generative AI has gradually impacted many industries. From machine learning to deep learning, artificial intelligence has begun to move towards multimodality since the release of GPT-4 in 2023. The development of hardware has increased the computing power of generative AI to further meet the needs of users. In some large language models, the thinking and search function makes the thinking logic of generative AI transparent, allowing users to better understand the logic of generative AI. In today's fast-paced educational environment, although the high-quality education system is constantly being built, the reversal of utilitarian education is not achieved in a handful. In the era of AI popularization, many shortcuts have emerged, and this paper mainly explores how the use of generative AI (Gen-AI) by high school students is related to their comprehensive innovation ability (such as writing articles, scripts, reports, etc.). This study is very meaningful in terms of the cognitive education system and educational outcomes. This paper uses the method of literature

review to analyze the influencing factors of this phenomenon by reviewing quantitative and qualitative data. To clarify the fair use norms of AI tools for high school students.

2 Literature Review

In *Transforming Education: A Comprehensive Review of Generative Artificial Intelligence in Educational Settings through Bibliometric and Content Analysis*, the paper studies the limitations and opportunities of generative AI in educational environments and contributes to the future improvement of generative AI, but there is a slight lack of research on the actions and perspectives of specific groups in the environment. This paper will start from the aspect of high school students' learning environment and analyze the influencing factors of their learning environment [1].

Therefore, users need to identify errors in the information and thus discern the validity of the information. For students, while generative AI is an efficient tool for obtaining information, it is difficult to detect errors in unfamiliar areas. The ability of literature to validate, evaluate, and meaningfully integrate information in digital environments is seen as key to the future of sustainable education [2].

The authors, including Yiling Ren, Lucy Michael Nyagoga, had discussed the trade-offs between the pros and cons of generative AI and its application in the education system. The basic use of generative AI in the education system and the overall attitude of Chinese scholars towards it have contributed to it, but it does not involve the willingness of other education groups to change much [3]. This article starts from the perspective of middle school and students and studies the application scope and attitude of high school students towards generative AI. Change in students' skill requirements due to the time period has led to a system-wide change, with rules governing generative AI in learning and students exploring the advantages and limitations of generative AI.

In the meantime, the article: *Perceptions of Primary School Teacher Education Students to the Use of ChatGPT to Support Learning in the Digital Era* uses a mixed approach to investigate one specific secondary school students' perceptions of generative AI. The results show that despite obstacles such as poor internet and device shortages, students are confident in using tools like ChatGPT. Research shows that AI not only improves teamwork efficiency but also plays a positive role in cultivating creativity and analytical thinking. This provides a clue to the positive side of the specific Gen-AI model and its advantage [4].

In *Understanding the impact of ChatGPT in education: Exploratory study of students' attitudes, perceptions, and ethics*, the researchers studied the views and usage of ChatGPT among high school and college students [5]. This paper will start from the possible factors leading to the research results and conduct a study on the external and internal factors that determine the way students collaborate with AI and supplement the existing research gaps.

Turmuzi et al. used mixed methods to study the perceptions of 45 primary school normal students on the use of ChatGPT. The results showed that students generally believed that the tool was easy to use, which improved the efficiency of knowledge acquisition and learning motivation. However, respondents also expressed concerns

about the impartiality of assessments, the risk of plagiarism, and the potential weakening of critical thinking skills. The study suggests that in the future, it is necessary to further explore how to use ChatGPT to effectively improve learning motivation [6].

Through a survey of 102 middle school and college students, it was found that students have diverse views on the use of ChatGPT in education. Research shows that students use the tool primarily for its potential for assisted learning, but also have differing attitudes about whether teachers should be informed about their use. The author emphasizes that the education sector needs to carefully integrate such AI technologies, be vigilant against students' blind dependence, and cultivate students' critical thinking while using their advantages [7].

The effects of over-reliance on AI dialogue systems on students' cognitive abilities: a systematic review in Chunpeng Zhai et al. studied how students' over-reliance on AI affects their cognitive abilities [8]. The contributing factors and influences contribute to this paper, but the existing research has paid little attention to the cognitive inertia caused by over-reliance on generative AI, such as the loss of independent thinking and critical thinking ability due to direct copying of AI content, which provides a research space for this paper to explore the influencing factors of AI on the cognitive ability of high school students in the educational environment.

Yavich, R in *Will the Use of AI Undermine Students Independent Thinking?* The article explores the impact of AI use on students' critical and independent thinking, emphasizes the duality of AI, and declares that it is instructional design that determines educational effectiveness, not just the existence of artificial intelligence [9]. This paper contributes to this study by analyzing the positive and negative effects of AI on students' thinking ability, but the research on the large-scale impact of AI is not comprehensive.

Artificial intelligence has developed rapidly, particularly in recent years, from a basic chat machine to a myriad of iterative language models. There is no denying that AI is entering people's lives. It is theoretically a technology that allows machines to simulate human intelligence, allowing users to engage in human-like conversations with it, but due to its feedback mechanism, there may be errors in information in the dialogue of large language models such as Deep Seek, due to the preference for big data, thus relying on algorithms rather than cognitive participation [10].

Among them, *the Development of local knowledge base application using retrieval augmented generation technology* mentions that the database of generative AI consists of a large number of different corpora [11]. The corpus can come from different regions and networks, but due to the subjectivity of collecting information, the trained large language model may produce problems such as ambiguous content, inaccurate, and unhelpful generated information as user requirements gradually increase. This is one of the main reasons why students are not encouraged to give full power to AI for their creativity. Because generative AI also has the subjectivity of opinions and the intermingling of opinions. There are no clear logical chains and rules for each generation. It is just a random search for available information related to instructions in the database. In addition, there is also valid information on the Internet that cannot be reached by AI, so when searching for information, in order to maintain the relevance and validity of the information, students should try to find and judge on their own.

In *ChatGPT and the digitization of writing*, Zhao, X et al The impact of ChatGPT on students' writing ability in advanced education, and students' use of other generative AIs in the long-term process of digital writing is included [12]. This paper has made pioneering contributions to exploring students' practical use of generative AI and exploring students' deep views on its advantages and concerns, but the exploration of different student groups is not comprehensive.

Based on the above analysis of the existing relevant literature, it is found that the current research status of this research direction is mainly divided into analysis of the advantages and disadvantages of generative AI in the field of education, expert views on Gen-AI, applications of Gen-AI, and students' attitudes and understandings towards AI. This article will analyze how generative AI affects students' creativity, explain students' dependence on AI tools, and examine them from the perspective of data, and fill the current research gap.

3 Case Study

3.1 Application of AI Usage

In China, some schools have begun to control the use of AI, clarifying the scope of academic integrity for different tasks, and international schools attach importance to the innovation and effectiveness of students' perspectives. At an international school, students' tasks are divided into three types: red, yellow, and green based on the degree of use of AI tools. Red tasks prohibit the use of any AI, yellow allows the use of AI for information retrieval and summarization, and green tasks allow students to use AI tools entirely. In schools, red tasks are mostly red, and yellow and green are less.

Among them, giving more red tasks can give students independence and critical thinking, and yellow and green can play an auxiliary role to reduce students' information load appropriately. In addition, the proportion of red tasks also limits students' opportunities to learn about AI tools, causing students to be disconnected from the educational goals of the AI era, making them unfamiliar with how to use AI rationally to enhance their learning abilities. In most public schools, because China mostly uses written tests, students generally use AI to analyze test papers to increase their memory of knowledge, and are not directly suspected of plagiarism. However, in some school performances, students still use AI to generate manuscripts, and institutional controls are not strict.

3.2 Over-Reliance on Using AI

In a creative writing assignment for a drama unit, the teacher asked students to create an original script around a designated theme and perform it. However, some students use generative AI tools directly to generate full text when completing assignments. The final work has obvious similarities with the award-winning script of a certain column in terms of plot structure and character setting, so it was identified by the teacher as suspected of plagiarism. After verification, the teacher will give low scores to the main responsible students and cancel the homework scores for other participating students. The teacher will deal with the main culprit with a low score, and the rest of the

participants will not be counted this time. The use of generative AI for writing is no longer new, and the quality of AI-generated works is uneven; students' creativity and independent thinking ability cannot be trained accordingly. It is very easy to cause a lack of experience and weaken teaching results. This case reveals a potential problem that balancing workload has become a challenge to solve in today's fast-paced life. Especially in schools, students are prone to fatigue due to the increase in schoolwork and pressure with the increase in grades, and because of the convenience and effectiveness of generative AI, they choose to balance the burden of schoolwork. Although this method lowers the threshold for creation, it does not allow students to form a long-term knowledge reserve, but it can leave knowledge blind spots.

4 Discussion

4.1 The Impact of Generative AI on Students' Creative Assignments

As the use of artificial intelligence increases year by year, the abuse and dependence on generative AI have begun to appear among students. The impact of generative AI on students' creativity is twofold. For example, in tasks such as design and writing, AI-generated first drafts or alternatives can be used as a "starting point" for students' creativity to help break through the limitations of thinking. On the other hand, AI may also inhibit originality if there is a lack of guidance - students may directly apply AI-generated content, weakening the independent ideation process and leading to a "homogeneous" tendency in the work, especially when the task itself emphasizes the individual's unique perspective. This phenomenon stems from availability bias, because the convenience of AI is inversely proportional to the difficulty of mastering complex knowledge, so under the pressure of time and schoolwork, students can easily choose to use generative AI, the so-called "shortcut". For this potential hidden danger, schools should popularize plagiarism checking tools and refine the guidance and education of students, so that teachers can understand students' problems and concerns, reduce information gaps, and enhance students' enthusiasm to complete their homework.

4.2 How Generative AI Assists Students

Generative AI can assist students under the compliance framework, but not limited to the framework. First of all, at the information processing level, generative AI can help students quickly retrieve, integrate fragmented knowledge, and indicate the source, reducing the burden of information screening in the network. Secondly, at the level of task efficiency, generative AI provides support in mechanical links such as sentence optimization and data visualization, allowing students to focus on the core thinking of the problem. Finally, at the level of learning feedback, it provides users with a sexualized service experience through real-time error correction and idea prompts. For example, in this case, the "yellow task" allows AI to summarize information, but using student thinking to complete the work is a rational use of this auxiliary function. Therefore, it is recommended that teachers regulate or guide students' use of generative AI as appropriate according to the difficulty of the coursework. Enable teachers and

students to retain independent thinking while being as efficient as possible and deliver high-quality teaching and homework.

4.3 Analysis of the Reasons Why Students are Overly Dependent on AI

The most significant incentive for students to over-reliance on AI is the ambiguity of external rules, such as the "verbal prohibition but lack of detection methods" in public schools, and students tend to rely on it due to the low cost of violations, saving time and effort, and leading to over-reliance. In addition, if the task is not properly designed, such as mechanical repetition or difficulty far beyond ability, students may use AI to "take shortcuts". The ease of use and immediacy of AI tools meet the pursuit of efficiency and quality, and other additional requirements for tasks, and their rapid generation of results can easily make students form a path dependence that can be completed without effort, especially when there is a lack of awareness of the boundary between "AI assistance" and "AI substitution". For this problem, students should promptly report the current problems to the teacher and seek help and advice from the teacher.

It is recommended to maintain transparency between teachers and students about their performance to play a supervisory role.

5 Conclusion

Based on exploring the impact of generative AI on high school students' comprehensive innovation ability in school, this paper conducts in-depth research in the field of education and technology, uses literature review research methods, and analyzes the topic through quantitative and qualitative data. It is concluded that generative AI tools have a positive impact on the comprehensive ability of most students. It is found that the development of the fast-paced information age has a restrictive effect on students' natural growth and accumulation of practical experience, resulting in their development slowing down. The comprehensive result of this study is that generative AI has two sides, which can not only share repetitive work and make people start creative work more efficiently, but also because of the wide range of uses of generative AI, it is easy for students with heavy writing tasks to become dependent on it. In the questionnaire, most students were skeptical about generative AI, but it did not affect its overall usage. In learning, generative AI can serve as an auxiliary work to integrate and summarize information, but its authenticity and clarity still need to be judged based on corpus sources and models. Therefore, it is further concluded that generative AI has a positive impact on the comprehensive innovation ability of high school students and promotes the generation efficiency of new ideas. However, due to the deviation of the educational environment, some content has been "homogenized". This study provides a lot of reference significance for future research in this direction, mainly providing the impact of generative AI on students' comprehensive ability, the causes of students' over-reliance on generative AI, the function of generative AI as an auxiliary role in education, and specific cases of its impact on students' comprehensive innovation ability. Future research should focus more on how to guide students to understand and reasonably drive artificial intelligence in the era of artificial intelligence revolution.

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