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Applications and Challenges of AIGC in Empowering Personalized Learning for University Students

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Abstract: *Personalized learning is the primary learning approach for contemporary college students. The emergence and development of Artificial Intelligence Generated Content (AIGC) technology have provided new opportunities for realizing personalized learning among college students. However, the use of this new technology also poses many challenges to personalized learning. This study explores the current applications and challenges of AIGC in empowering personalized learning for university students through methods of literature review and case analysis. The research finds that AIGC can currently meet the personalized learning needs of college students, but it also faces challenges such as students' excessive dependence on AI and the weakening of teacher-student relationships.*

Keywords: *AIGC; College Students; Personalized Learning; Applications; Challenges*

1. Introduction

1.1. Personalized learning is a trend in education in the information age

At the World Digital Education Conference 2023, the "China Smart Education Blue Paper (2022)" was released, which outlines the direction for future education development. Specifically, it advocates for promoting educational transformation through technology empowerment, providing education tailored to learners' individual needs, and establishing a high-quality personalized lifelong learning system [1]. During his presentation at the World Library Future Forum 2024, Song Yi from the Department of Higher Education of China's Ministry of Education pointed out that the current educational goal centers on enhancing talent cultivation capabilities. It is necessary to create ubiquitous, personalized, and collaborative learning scenarios to meet students' diverse learning needs, including independent learning, collaborative learning, and research-based learning [2]. This indicates that enabling learners to achieve personalized learning has become the current and future trend in education, and the educational objectives of the future are also evolving towards the goal of realizing personalized learning for learners.

1.2. The demand for personalized learning among university students is increasingly growing

University students possess certain abilities of independent thinking and self-management, as well as strong learning decision-making power. They also have more discretionary time and greater freedom in their learning. University students possess strong technical proficiency, enabling them to search for required data using smart phones, computers, and other network devices. The development of emerging technologies such as the Internet, artificial intelligence, and big data has increasingly intensified university students' demand for personalized learning. The vast majority of university students are able to effectively use internet tools to search for professional materials. The vast amount of information available can cater to students' individual characteristics and interests, thereby enhancing their motivation and initiative in learning, stimulating their enthusiasm, and ultimately enabling autonomous and personalized learning among university students [3].

1.3. The development of AIGC provides opportunities for personalized learning among university students

With the rapid development of the information society, technology has sequentially evolved through the development of network technology, big data, cloud computing, artificial intelligence, and Artificial Intelligence Generated Content (AIGC). AIGC has gradually emerged as a key focus of attention across

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various industries, providing multifaceted support and impetus for the digital transformation of education within the educational field.AIGC can empower personalized learning for university students in various aspects such as learning content, learning methods, learning evaluation, question answering, and learning feedback [4]. AIGC tools such as ChatGPT, GoogleAI, ERNIE Bot, etc., can promptly search and organize information based on user input, outputting the required content in the form of a conversation.Unlike the traditional presentation of web-based information, AIGC tools can process and organize their databases based on the questions input by students, and then output structured answers to those questions. The vast amount of learning materials and conversational learning format provided by AIGC offer new opportunities for personalized learning among university students.

This study, titled *Applications and Challenges of AIGC in Empowering Personalized Learning for University Students*, investigates the relevant connotations of AIGC empowering personalized learning for university students through methods such as literature review and application case analysis. This study analyzes the current application of AIGC in personalized learning for university students and the challenges faced in the current era, in order to seek the optimal path for AIGC to empower personalized learning among university students.

2. Definition of AIGC and Personalized Learning Concepts

2.1. Artificial Intelligence Generated Content(AIGC)

Artificial Intelligence Generated Content(AIGC) is a branch of artificial intelligence. It is a technology that generates text, images, videos, code, and other content based on algorithms, models, and rules. It can generate and output content with a certain degree of logic and coherence according to user needs, relying on pre-trained multimodal foundational large models and other resources [5]. Currently, the most widely used generative AIGC tools include ChatGPT, ERNIE Bot, New Bing, iFLYTEK Spark, among others. They all enable users to input questions and then generate answers required by users according to their own algorithmic patterns. Generative artificial intelligence is characterized by creativity, flexibility, efficiency, and scalability. Creativity refers to its ability to generate novel content based on users' needs and preferences. Flexibility manifests in its capability to be applied to various data types, such as images, audio, and text. Efficiency is embodied in its relatively efficient training process, which allows for the rapid generation of large amounts of data. Scalability, on the other hand, is demonstrated by its ability to improve the quality of generated content through increased data volume and model complexity. These four characteristics of AIGC also provide strong support for college students to achieve personalized learning.

2.2. Personalized learning for college students

The concept of personalized learning emerged as early as the early 20th century. It refers to learning that adopts flexible and suitable methods to fully meet the individual needs of learners based on their personality traits and development potential [6]. The concept mainly emphasizes the need to pay attention to the differences among different learners, such as knowledge base, cognitive abilities, attention characteristics, learning preferences, etc. which are all important factors that affect individual learning. Based on learning theories, educational practice needs, and educational trends, personalized learning for current college students is characterized by autonomy, diversity, and interactivity. Autonomy is reflected in the daily learning of college students, as learning at the university level requires a strong sense of initiative. Diversity is manifested in the development of technological tools that have made learning resources for college students diverse and abundant, with tools like mobile phones and tablets that are easy to carry around, making learning methods for college students diversified as well. Interactivity is demonstrated in the need for college students to communicate and collaborate with others in their daily learning, forming their own thoughts through these interactions. The emergence of generative artificial intelligence has enhanced these characteristics and promoted personalized learning for college students.

3. Application of AIGC in Personalized Learning for University Students

Currently, AIGC has penetrated into institutions of higher education. According to relevant survey results, 89% of college students in the United States admit to using ChatGPT to complete homework, and 53% of students use ChatGPT to prepare for exams [7]. Since the release of ChatGPT by the American company OpenAI at the end of 2022, other technology companies such as Microsoft, Google, Baidu, and

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others have also refused to be outdone, successively launching their own large AIGC models. In addition to enterprises, college students are also one of the vast user groups for these tools. In China, scholars have conducted surveys on the use of generative AI tools among college students. The results revealed that two-thirds of college students began using generative AI tools in December 2022, while one-quarter only started using them in July 2023. Among these tools, ChatGPT was the most frequently used AIGC tool (83.45%), followed by ERNIE Bot (36.72%), New Bing (30.50%), and iFLYTEK Spark (9.75%) [8]. It is evident that the college student population closely follows the trend of modern technological development and is adept at incorporating new technologies into their studies and daily lives. Since the release and adoption of AIGC by college students, scholars have also been exploring ways to apply these tools to promote personalized learning among university students. This chapter collects and analyzes two cases of AIGC empowering personalized learning for college students.

3.1. AIGC Facilitates the Construction of University Libraries Supporting Personalized Learning

Liu Hongwei and his colleagues analyzed the current issues in the resource construction of university libraries. They believe that university libraries currently face problems such as insufficient resource provision, lack of proactive service, and inadequate accuracy in student profiling, which hinders their ability to provide students with learning resources that suit their needs. To address this issue, scholars propose integrating AIGC technology into the resource construction of university libraries to create an AI-driven personalized learning support service system [9]. This system focuses on students' own learning experience and efficiency, capable of analyzing learners' characteristics to form personalized learning profiles. With the support of intelligent systems, libraries can intelligently recommend academic resources that meet learners' individual needs based on these profiles, or generate new learning support resources using large models according to knowledge point requirements, planning personalized learning paths that align with students' cognitive abilities.

3.2. The Application of AIGC in Realizing Personalized Learning in Course Teaching

In traditional classrooms, teacher explanations and student listening dominate, often neglecting students' individuality. The application of AIGC in course teaching can address this issue by paying attention to personalized learning. Researchers have analyzed that to implement personalized teaching models using AIGC, attention should be paid to three aspects: educational resources, course design, and educational evaluation. In terms of educational resources, integrating AIGC into the classroom can provide college students with abundant personalized learning resources, breaking the traditional uniform way of thinking, giving students opportunities for self-decision making, and increasing individual autonomy. Secondly, in course design, AIGC can facilitate cross-time and cross-media inquiry-based learning after class, providing students with a personalized autonomous learning environment. In terms of educational evaluation, the dialogic nature of AIGC allows students to communicate with it to obtain corresponding evaluations and suggestions, which can help students conduct self-analysis and reflection [10].

In summary, the application of AIGC technology in university library resource construction and course teaching has opened up new pathways for the realization of personalized learning. By constructing an AI-driven personalized learning support service system, university libraries can not only effectively address the issues of insufficient resource provision and proactive service but also accurately depict student profiles, thereby intelligently recommending and generating learning resources that meet students' individual needs. Meanwhile, in the field of course teaching, the application of AIGC technology has broken the limitations of traditional classrooms. By enriching educational resources, innovating course design, and optimizing educational evaluation methods, it has truly centered on students, promoting the development of their individuality and enhancing their autonomous learning abilities. In the future, with the continuous maturity and popularization of AIGC technology, we have reason to believe that personalized learning will become a mainstream trend in the field of education, providing more precise and effective support for the comprehensive development of every college student.

4. Challenges in Empowering Personalized Learning for College Students through AIGC

Technology is a double-edged sword. While providing convenience for personalized learning among college students, its negative impacts are gradually emerging. In the nearly two years since its adoption by college students, AIGC, despite being convenient and precise, has gradually given rise to issues such

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as the ease of addiction among students, undermining their autonomy and creativity, and leading to an imbalance in educational evaluation that results in the weakening of teacher-student relationships. At the same time, the accuracy and values of information generated by AIGC are difficult to guarantee, which can affect students' cognition and values [11]. This section focuses on enumerating the challenges faced in empowering personalized learning for college students through AIGC, which will lay the foundation for college students to use AIGC tools reasonably.

4.1. Over-reliance on AIGC by learners can weaken their autonomous thinking abilities

AIGC is capable of generating well-structured answers and outputting them promptly based on the information input by learners, making the acquisition of knowledge more convenient than ever. In the past, students would integrate the content of web pages presented to them according to their own needs when using search engines like Google or Baidu to gather information. However, with AIGC searches today, answers are automatically integrated and presented in a reasonable structure. While this method undoubtedly reduces the time students spend searching and integrating information, enhancing learning efficiency, it also tends to make students reliant on this approach. Over time, students may become more inclined to directly adopt the answers generated by AIGC without further in-depth thinking, which undoubtedly weakens their autonomous thinking abilities.

4.2. Over-reliance on AIGC by learners can weaken their autonomous thinking abilities

As AIGC technology relies on algorithms and big data, the accuracy and objectivity of information may be influenced by various factors such as data sources, algorithm design, and human intervention. For example, when ChatGPT 3.5 was introduced to the Chinese market at the end of 2022, given that its data mainly originated from English webpages and its training data was up to September 2021, the model may not provide precise answers for specific information within China or news events that occurred after September 2021. Furthermore, AIGC tools currently available on the market generally have the ability to generate logically consistent answers to various questions, even if those questions have not yet reached a consensus in the academic community. Therefore, the answers generated by AIGC are not entirely accurate and truthful. When using such tools, college students should learn to view them with a dialectical perspective and judiciously assess the reliability of their content.

4.3. AIGC may weaken the emotional interaction between teachers and students

While AIGC can provide insights into students' needs and assist teachers in improving teaching methods, it can also easily obscure the original purpose of education and weaken the emotional interaction between teachers and students [12]. In the past, teachers could gain a deep understanding of students' learning status and emotional needs through direct communication with them during the teaching process, thereby providing guidance. With the popularization of AIGC technology, students may be more inclined to rely on technological tools to acquire knowledge, reducing opportunities for face-to-face communication with teachers and leading to a gradual weakening of emotional ties between teachers and students.

5. Summary and Recommendations

To explore personalized learning for college students empowered by AIGC, this paper first clarifies the concepts of two specialized terms by reviewing relevant literature on AIGC and personalized learning for college students. Secondly, through literature research, it is understood that the main applications of AIGC in empowering college student learning include contributing to the intelligent construction of university resources (such as libraries), analyzing student characteristics, and providing them with suitable learning resources. At the same time, AIGC can empower teachers' instruction, helping them create classrooms suitable for students' personalized development. Subsequently, the paper analyzes the current challenges faced in empowering personalized learning for college students through AIGC, including the weakening of autonomous thinking abilities due to learners' over-reliance on AIGC, the need for further verification of the authenticity of information generated by AIGC, and the potential dilution of emotional interaction between teachers and students as learners turn to AI for answers to all their questions. Finally, based on the above analysis, suggestions for empowering personalized learning for college students through AIGC are proposed:

5.1. Cultivate autonomous learning abilities and balance AI assistance with independent thinking

Universities should offer related courses or lectures to teach students how to effectively utilize AIGC

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tools while cultivating their autonomous learning strategies and habits. During teaching, instructors can set up autonomous learning projects or challenges, requiring students to independently complete research or learning tasks without direct assistance from AIGC, in order to enhance their abilities to think independently and solve problems.

5.2. Incorporate critical thinking to assess the authenticity and accuracy of AIGC information

Universities should encourage college students to maintain critical thinking when using AIGC tools, not blindly accepting information generated by AI, but instead learning to screen, verify, and integrate information. They should maintain a skeptical attitude towards the generated information and, based on their own needs, understand and process knowledge through their own thinking.

5.3. Promote human-machine collaboration and enhance emotional interaction between teachers and students

When using AIGC technology, teachers should maintain face-to-face communication with students, enhancing interaction and emotional connections between them through discussions, questioning, and feedback. Additionally, teachers can carry out blended online and offline teaching activities, utilizing AIGC technology to provide personalized learning resources while promoting in-depth exchanges and cooperation between teachers and students through offline activities such as seminars and workshops.

The emergence of AIGC has brought unprecedented and profound changes to the field of education, opening up vast spaces and numerous opportunities for personalized learning among college students. Indeed, it is accompanied by a series of challenges and difficulties in its application process. However, as long as appropriate and reasonable application strategies can be adopted, AIGC will undoubtedly become an important force in promoting the realization of personalized learning for college students.

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