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In-Depth Application of Artificial Intelligence-Generated Content AIGC Large Model in Higher Education

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Abstract: Artificial Intelligence Generated Content (AIGC) large models have shown broad application prospects in various fields, and their in-depth application in higher education has also attracted widespread attention. This study aims to explore the application of the AIGC large model in higher education and evaluate its impact on teaching effectiveness. This study used literature review and experimental analysis methods to collect and analyze relevant literature. The research focuses on the application of AIGC in personalized learning, teaching resource expansion and automated assessment, and evaluates its effects. Research results show that AIGC can increase teaching efficiency to 96%. Its in-depth application in higher education has potential and advantages, and it can realize personalized learning and intelligent assisted teaching, provide customized learning resources and guidance, and promote students' learning outcomes and learning motivation.

1. Introduction

As an innovative educational technology, the artificial intelligence generated content (AIGC) large model has attracted widespread attention in the higher education community. The AIGC large model can automatically generate teaching materials; provide personalized guidance and automated assessment based on a large amount of data and algorithms, bringing new possibilities to higher education. Therefore, in-depth research on the application value and effect of AIGC large models in higher education is of great significance for promoting educational reform and improving teaching quality.

Many scholars have conducted research on the application of artificial intelligence in education. Among them, Jin Hui analyzed six key technologies and practices: "artificial intelligence applications that support prediction and personal learning", "generative artificial intelligence", "fuzzy learning boundaries", "flexible learning", "micro-credentials" and "supporting learners' sense

of belonging and connection"[1]. Zhang Feng established the form, content, evaluation and supervision mechanism for artificial intelligence technology to assist college students in learning, in order to accelerate the deep integration of intelligent technology and higher education and promote the digital transformation and high-quality development of higher education [2]. Xun Yuan believed that higher education in the era of artificial intelligence must adhere to the intrinsic value of higher education and focus on the development of students' morals, ethics, spirit and creativity, and at the same time provide necessary guidelines for the rational application of artificial intelligence to ensure that the younger generation can continue to develop the collective wisdom of mankind on the premise of using artificial intelligence correctly, thereby creating a future of common happiness for mankind [3]. However, there are still many unresolved issues regarding the in-depth application of AIGC in higher education, which require further research and exploration.

This article aims to explore the in-depth application of the AIGC large model in higher education and evaluate its impact on teaching effects. In order to achieve this goal, this study adopted a literature review approach. The literature review will collect and summarize existing relevant research results and practical cases to comprehensively understand the current status and trends of AIGC application in higher education. The significance of this research method is to provide a comprehensive understanding of the application of AIGC in higher education, and to provide guidance and reference for subsequent research and practice.

The main contribution of this article is to deeply explore the in-depth application of the AIGC large model in higher education and evaluate its teaching effect. Through a literature review, this article will comprehensively demonstrate the application status and effects of AIGC in personalized learning, teaching resource expansion, and automated assessment. At the same time, this article will also propose relevant solutions and suggestions for the challenges faced by AIGC in higher education. These research results will provide important reference and guidance for higher education institutions and education practitioners to promote the improvement of teaching effects and the promotion of educational innovation.

2. Learning Aids

2.1 Automated Teaching

Automated teaching can use artificial intelligence content generation technology to automatically generate teaching materials and handouts. Teachers can input relevant topics or questions, and the system can automatically generate suitable teaching resources, such as course handouts, exercises, case studies, etc., based on subject knowledge and learning objectives. Through learning management systems or online platforms, teachers can upload and organize various teaching resources, including teaching materials, courseware, videos, audios, etc. [4-5]. Through learning management systems or educational technology tools, teachers can monitor and analyze learners' learning processes, obtain learners' learning data and behavioral information, including learning progress, answer questions, study habits, etc., so that students’ learning status can be understood in a timely manner and individual guidance and support can be provided as needed. Automated teaching can provide personalized learning support and guidance based on learners' individual needs and learning characteristics. Based on learner data and analysis results, the system can recommend suitable learning resources, provide personalized learning routes and plans, and adjust learning content and teaching strategies based on learner feedback and performance. Figure 1 shows the current popularity of automated teaching in colleges and universities in the past five years:

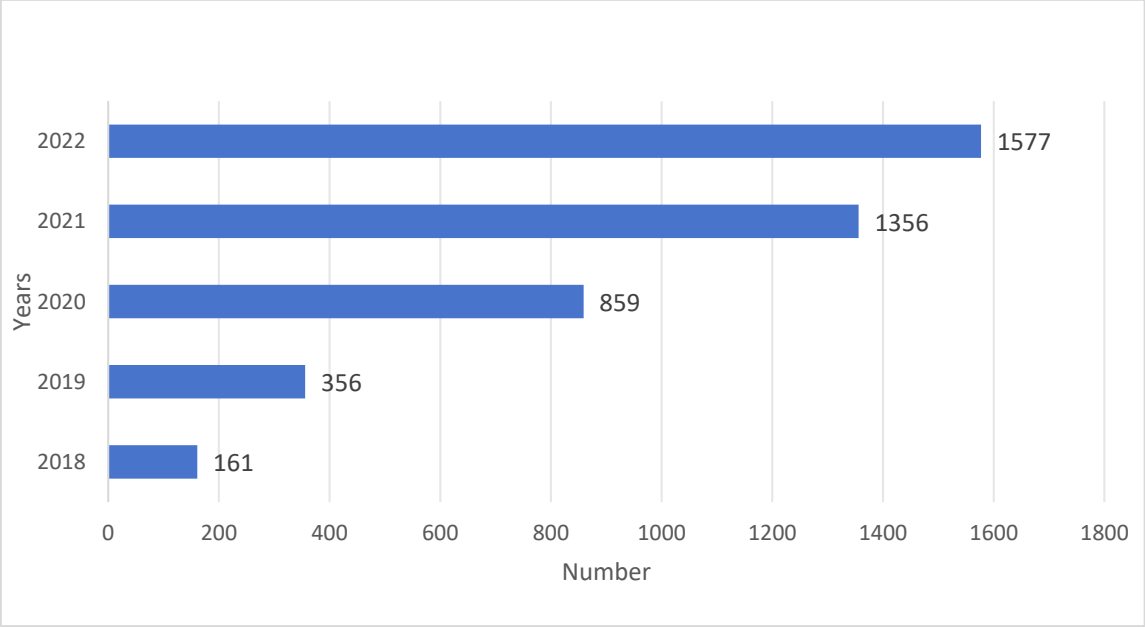

Figure 1: Popularization of automated teaching in colleges and universities in the past five years

2.2 Intelligent Q&A and Problem Solving

Using artificial intelligence technology and natural language processing technology to provide intelligent answers to students' questions. Through natural language processing technology, the questions asked by students are analyzed and corresponding answers are automatically given. This kind of system can provide accurate and timely answers based on pre-prepared knowledge bases, teaching materials or resources on the Internet, help students solve problems, and provide targeted answers to questions based on students' individual needs and learning background. Through information such as students' learning records, personal preferences, and learning goals, the system can customize answers to students' questions and provide personalized learning suggestions and resource recommendations [6-7]. By answering questions in text form, the system can also support multi-modal question answering. For example, the system can parse non-textual information such as pictures and charts provided by students and provide answers or explanations in the corresponding form. The system provides real-time question answering and tutoring services. Students can ask questions to the system through online platforms or mobile applications and get answers quickly. This kind of real-time question answering and tutoring can help students eliminate confusion in a timely manner during the learning process and improve learning efficiency [8-9].

2.3 ChatGPT

As an online intelligent teaching assistant, ChatGPT (Chat Generative Pre-trained Transformer) will generate corresponding answers or explanations based on its pre-trained language model and training data to answer questions students encounter during the learning process. Students can enter questions or doubts, which can help students, solve problems quickly and provide learning support. When students learn new concepts or knowledge, they sometimes encounter difficulties in understanding. It can provide support for explanation and conceptual understanding [10-11]. Students can ask questions about specific concepts, and ChatGPT can generate concise and clear explanations to help students understand and master relevant concepts. It recommends relevant learning resources based on students' learning needs and interests. Students can provide it with their

own learning goals or topics, and ChatGPT can recommend suitable learning materials, textbooks, courses, etc. based on its pre-trained model and knowledge base, helping students obtain more valuable learning resources. ChatGPT can assist students in making study plans and managing study time. Students can consult it about study arrangements, time allocation, learning efficiency, etc. ChatGPT can give corresponding suggestions and strategies to help students formulate reasonable study plans and improve learning effects [12-13]. Table 1 shows the number of ChatGPT users in the past two years.

Table 1: Number of users in the past two years

Time	ChatGPT-3.5
Early 2021	3200000
Late 2021	14000000
Early 2022	182500000
Late 2022	314260000

3. Scientific Research Support and Innovation

3.1 Information Acquisition

Artificial intelligence can be used to develop intelligent search engines, which can index and analyze a large number of academic documents, textbooks, research papers, etc. through natural language processing and information retrieval technology to provide students and teachers with accurate and comprehensive information retrieval services. Such a search engine can help users quickly find the learning resources and knowledge they need. Through automated management and intelligent recommendations of library resources, it can provide students and teachers with more convenient and personalized library services. Smart libraries can recommend relevant books, journals and research materials based on users' interests, subject areas and learning needs, and provide customized access to learning resources. Through natural language processing and dialogue generation technology, the system can systematically answer students' questions and provide learning support and guidance [14-15]. Students can have conversations with virtual teaching assistants to obtain relevant learning information and answer questions. Virtual teaching assistants can continuously learn and improve the quality of their answers based on pre-prepared knowledge bases and teaching materials, or through interactions with students. The system helps students better obtain learning resources and information through automated learning management and intelligent learning recommendations. Online learning platforms can recommend appropriate teaching content, learning tasks and assessment methods based on students' learning data and behaviors, and provide personalized learning experiences and information acquisition channels.

3.2 Scientific Research and Creation

AICG can be used to build an intelligent document retrieval system to quickly and accurately retrieve relevant academic documents and research materials through natural language processing and information extraction technology. Artificial intelligence helps conduct literature reviews. Through automated analysis and combing of large amounts of literature, it provides comprehensive literature review reports to help researchers quickly understand cutting-edge research trends and related work. It can help researchers process large-scale data sets, apply machine learning algorithms for data analysis and modeling, and discover patterns and regularities in data. These analysis results can be used for empirical research and data support in scientific research creation [16-17]. Applying it to automated writing assistance can help researchers generate first drafts or

drafts of scientific papers. Through natural language processing and generative models, artificial intelligence can automatically generate parts of the paper, such as abstracts, introductions, methods, results, etc., based on key information and structures provided by researchers. This saves researchers time and energy, allowing them to focus more on in-depth research and innovation. As a virtual teaching assistant or writing guidance tool, AICG can provide guidance and advice on academic writing [18-19]. It checks and corrects grammatical errors, spelling errors and formatting issues in papers according to academic writing conventions and examples. In addition, it can provide suggestions on writing style and structure to help researchers improve the quality and readability of papers, and can promote academic collaboration and knowledge sharing. It can help researchers discover potential partners and match them based on research areas and interests [20].

3.3 Multi-Language Translation and Language Learning

Students and teachers in higher education often need to communicate and translate in multiple languages. AICG can evaluate learners' spoken and written language through technologies such as speech recognition, grammatical analysis, and semantic understanding, and provide targeted language learning suggestions and feedback. In addition, artificial intelligence can also recommend appropriate learning materials, exercises and study plans based on learners' needs and interests, providing personalized learning experience and support. It can provide online multi-language translation tools to help users quickly translate text, files or web content into other languages. Such tools can improve the efficiency of multilingual communication and promote cross-cultural communication and cooperation. Through natural language processing and generative models, artificial intelligence can generate various types of language learning materials based on language learning goals and difficulty, such as vocabulary exercises, grammar fill-in-the-blanks, listening comprehension, etc. Such automated generation can provide a large number of learning resources to meet the needs of different learners. Through speech recognition and speech synthesis technology, artificial intelligence can simulate dialogue and communication situations and provide real-time speech feedback and correction. Learners can improve their oral expression and language understanding skills through conversations and exercises with artificial intelligence.

4. Evaluate the Impact of AIGC on Education

4.1 Evaluation Method

The article uses a questionnaire survey to evaluate the impact of AIGC on education, and evaluates its impact by comparing students' academic performance before and after receiving AIGC, as well as the improvement in teaching efficiency. After one semester, the teaching results of the two classes were tracked, with one group serving as experimental subjects and the other serving as control subjects for testing. The subjects tested are Chinese, mathematics, English, physics, chemistry, biology, history, geography, and politics.

4.2 Discussion of Results

Figure 2 shows the comparison of the impact of the two methods on grades, and Figure 3 shows the comparison results of the teaching efficiency test.

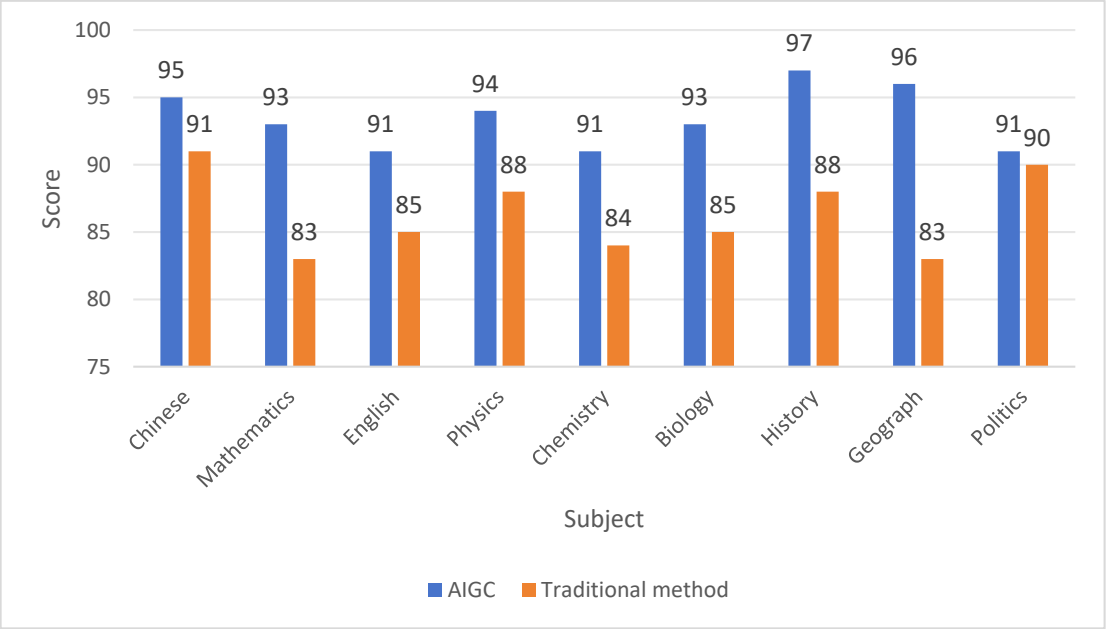

Figure 2: Score comparison

In the questionnaire in Figure 2, the average scores of all subjects of the students in the two classes were calculated, and then the average scores of each subject were compared to compare the subject scores of the two methods. It can be clearly seen from Figure 2 that the scores of students using AIGC assisted education are 91-97 points in various subjects, while the scores of traditional teaching methods are 83-91 points. After experiments have proven the positive impact of AIGC on teaching performance, AIGC may be able to provide customized teaching support based on students' individual needs and learning progress. It can intelligently adjust and provide personalized guidance based on students' ability levels and learning styles, thereby better meeting students' learning needs and improving learning results.

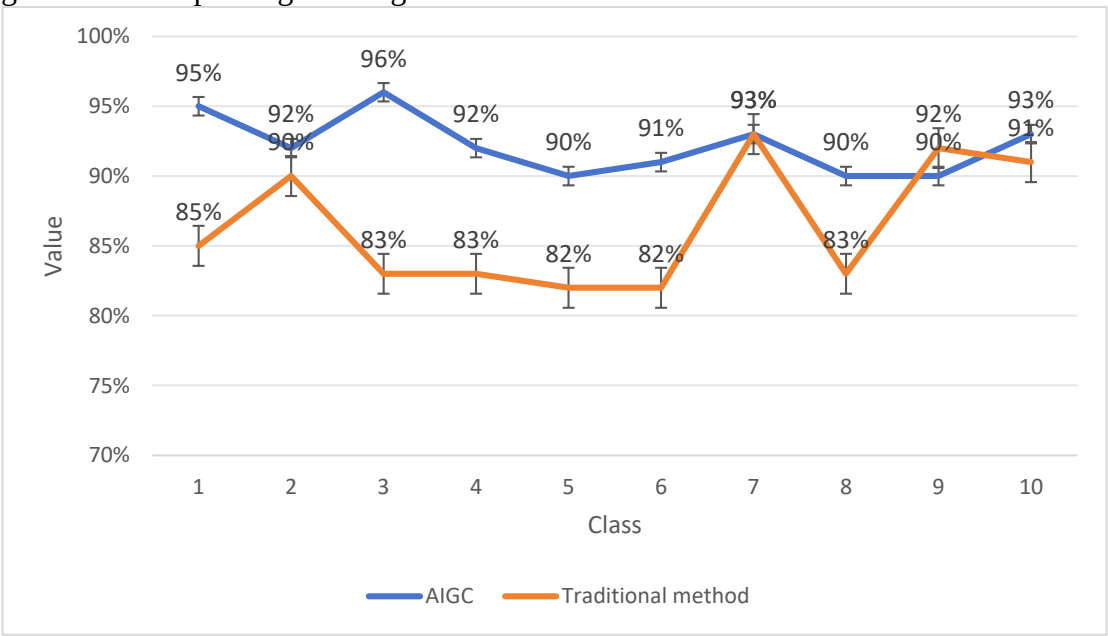

Figure 3: Comparison of teaching efficiency

In the experiment in Figure 3, the teaching efficiency test was conducted on 10 classes. The

teaching efficiency of the method studied in this article was between 90% and 96%, and the teaching efficiency of the traditional method was between 82% and 93%. AIGC can deliver knowledge and teaching content at a faster speed, allowing students to learn more content in the same period of time. It uses intelligent learning resources and personalized guidance to help students' master knowledge and skills more efficiently, thereby accelerating learning progress.

5. Conclusion

The in-depth application of artificial intelligence generated content (AIGC) large models in higher education has potential and advantages. It can bring many innovations and improvements to the field of higher education, thereby improving the quality of teaching and learning. In terms of personalized learning and intelligent assisted teaching, by analyzing students' learning data and behaviors, AIGC can provide customized learning resources and guidance, and provide personalized teaching according to students' learning needs and ability levels. This helps improve student learning outcomes and motivation. In terms of teaching content and resources, it can generate a large number of high-quality teaching materials and learning resources, including textbooks, teaching videos, exercises, etc. Such resources enrich teaching content, meet students' different learning styles and needs, and promote independent learning and in-depth understanding. In terms of automated assessment and feedback, it can quickly analyze students' homework, test and exam answers, and provide timely and accurate assessment and feedback. This helps teachers better understand students' learning progress and problems, and provide targeted guidance and support.

In order to realize the full potential of AIGC in higher education, there are still some challenges. These include data privacy and security, algorithm transparency and explain ability, the changing role of teachers, and more. Addressing these challenges requires the development of corresponding policies and norms to ensure that the application of AIGC complies with educational ethics and laws and regulations.

The in-depth application of artificial intelligence-generated content (AIGC) large models in higher education has great potential to improve teaching quality, student learning effects, and teacher teaching efficiency. However, its limitations need to be recognized during application and appropriate measures taken to ensure that it is effective, transparent and consistent with educational values.

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