

Artificial Intelligence in Higher Education: A Brief Review of Current Studies

Hang-Yue Yang and Hao Ni

Department of Business Management, Chengdu Neusoft University, Chengdu 611844, China

Abstract: The rapid advancement of artificial intelligence (AI) in the 21st century has revolutionized various sectors, including higher education. This paper reviews the integration of AI in higher education, focusing on foreign studies and the current situation in China. The integration of artificial intelligence (AI) into higher education represents a pivotal research and development focus in the 21st century. While foreign studies have extensively delved into AI's role in education, particularly in STEM and computer science, Chinese research has been less prevalent, with a focus on AI's integration with ideological and political education. This paper reviews the current state of AI in education and proposes future research directions.

Keywords: artificial intelligence; higher education; review

1. Introduction

The development of science and technology in the 21st century has brought many changes to human society, among which the application of artificial intelligence (AI) technology in all aspects of human life has brought revolutionary impacts to various industries, including the field of higher education, with the emergence and development of tools such as ChatGPT, Wenxin Yiyan, Kimi, and so on.

2. Key Foreign Studies of AI in Higher Education

Research on the application of artificial intelligence technology in the field of education is currently dominated by foreign literature. The rapid development of artificial intelligence in the field of education has a history of more than 30 years. Alam & Mohanty summarized the literature before 2021 through systematic literature review: among the 2984 articles from 2006 to 2021, only 112 articles met the inclusion criteria [1]. Among them, research related to science, technology, engineering, mathematics (STEM) and computer science dominated the articles on artificial intelligence education (AIEd), and “quantitative methods” played a leading role in empirical research. The research results are divided into four categories: (1) intelligent tutoring systems; (2) personalized and adaptive systems; (3) assessment and evaluation; (4) prediction and analysis. These research results firmly call for attention to the challenges and risks brought by artificial intelligence, as well as the ethical, moral, and educational technology issues it brings.

With the global popularity of ChatGPT, the first batch of academic journal articles on artificial intelligence and higher education, especially on assessment, learning, and teaching, were published in 2023 [2]. In January 2023, the journal “Cell and Biomolecular Engineering” published an academic paper written by ChatGPT,

which answered questions about artificial intelligence, chatbots, and academic plagiarism in higher education, including but not limited to: (1) the history of artificial intelligence and chatbots; (2) how college students use ChatGPT to cheat on papers; (3) suggestions for how university professors can assign homework to minimize potential cheating; (4) what higher education needs to pay attention to in terms of the potential for misuse of artificial intelligence; (5) writing references (considering the fairness of ethnicity and gender). This paper is the first academic paper published and published by the academic community with artificial intelligence as the author, which also means that higher education and the academic community have to face a series of changes under the impact of artificial intelligence technology.

After the emergence of new artificial intelligence represented by ChatGPT, the research on various teaching elements related to the teaching form of higher education under the influence of artificial intelligence technology has also increased. Rudolph analyzes the opportunities and threats brought by artificial intelligence education (AIED) research to higher education teaching and assessment from the entry point of applications oriented to students, teachers, and systems, and gives the following suggestions [2]: (1) higher education workers should recognize that artificial intelligence tools should be part of the curriculum, including writing and grammar checking tools represented by Grammarly, etc.; (2) train teachers in the use of artificial intelligence; (3) provide academic integrity training for college students; (4) avoid providing meaningless courses and homework for students (meaningless work will breed cheating behavior); (5) update academic integrity policies and reward and punishment policies, and formulate clear and easy-to-understand guidelines and policies for the use of AI language models; (6) encourage, support, and share research on the impact of AI teaching.

In terms of talent training models and curriculum settings, some colleges and universities represented by the University of Florida (UF) are integrating artificial intelligence into all courses, with the goal of creating a talent team that meets the needs of the global labor market and government in the 21st century. Using AI to promote interdisciplinary participation, innovative AI courses, and student practice activities, while ensuring students' professional skills and literacy [3].

In terms of teacher performance and assessment, Liu & Fang established a new fine evaluation model for college teacher performance based on the current situation of college performance evaluation worldwide, using the radial basis function neural network in artificial intelligence technology [4]. The training sample size of this study is not large enough, and the weight coefficient evaluation index may not be applicable to all colleges and universities, but the practical attempt to empower college education management with AI technology is relatively leading.

In terms of teaching and learning methods, Alam used adaptive learning and intelligent tutoring robots for virtual classrooms and smart campuses, confirming that the application of artificial intelligence technology such as adaptive learning, smart campuses, teacher evaluation, intelligent tutoring robots, and virtual classrooms has a beneficial impact on the teaching quality provided by teachers and students' learning outcomes [5]. In addition, Noi & Zhang also confirmed through online experiments that the average productivity of higher educated professionals performing intermediate professional writing tasks using ChatGPT has been significantly improved, and pointed out that ChatGPT mainly replaces the labor part of workers, rather than supplementing workers' skills. These studies have demonstrated the great potential of artificial intelligence in helping schools promote educational reform [6].

Dogan, Dogan & Bozkurt examined artificial intelligence from the perspective of online distance education, combining literature review and data analysis methods to analyze 276 publications, pointing out that China, India, and the United States are leading countries in AI online learning and distance education [7].

3. Current Situation of Studies in China

However, there are relatively few Chinese documents on the application of artificial intelligence technology in the field of education. Some studies focus on the integration of artificial intelligence and college ideological and political education, such as Li Qiuyun advocating to clarify the primary and secondary relationship between ideological and political education and artificial intelligence, using artificial intelligence technology to improve teaching evaluation standards [8]; Wu Kewai and Lei Juan use artificial intelligence technology to explore the

obscured and missing parts of ideological and political education in online course teaching, aiming to integrate the cultural genes and value paradigms in various courses into online education, truly achieving full coverage of course ideology online and offline [9]. In addition, Zhang Panhong analyzed the current situation and problems of college teachers' information technology teaching ability in the age of artificial intelligence, and made analysis and countermeasures for a single college case [6]. Wu Hailan took some colleges and universities in Shanxi Province as a case to analyze the current research gap in the field of artificial intelligence general education in China [9]. There are also studies on college talent training models, industry-education integration, personnel management, etc. under the background of artificial intelligence. These studies generally adopt the method of case study, temporarily lack empirical verification, and lack specific application data analysis of artificial intelligence technology in education and teaching.

4. Conclusion

The integration of artificial intelligence (AI) into higher education has been a significant focus of research and development in the 21st century. Foreign studies have extensively explored AI's application in education, with a particular emphasis on STEM and computer science. In contrast, Chinese research on AI in education is less prevalent, with some studies concentrating on AI's integration with ideological and political education.

Based on current research, future directions in this field may focus on the following points: (1) the specific artificial intelligence and machine learning algorithms used in higher education teaching, including content creation, information analysis, content enhancement and post-production workflows, information extraction and enhancement, and data compression, etc.; (2) the application of artificial intelligence technology in higher education, including tools used in distance education, online teaching, teaching methods of teachers, learning outcomes of students, curriculum settings, assessment methods, etc., as well as how artificial intelligence is integrated into talent training programs and daily teaching, and to examine, discuss, test, and analyze various variables in the educational process; (3) to explore the revolutionary changes that the use of artificial intelligence has brought to the educational forms and shapes of higher education, to what extent, and what the possible future development directions might be.

Funding

Not applicable.

Author Contributions

Conceptualization, data collection, analysis, H.-Y.Y. and H.N.; writing—original draft preparation, H.-Y.Y. and H.N.; writing—review and editing, H.-Y.Y. and H.N. All of the authors read and agreed to the published the final manuscript.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

Not applicable.

Conflicts of Interest

The authors declare no conflict of interest.

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