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*Original Paper*

# Chinese Higher Education Reform through A.I.: Evolution and Inheritance

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## 1. Introduction

Artificial intelligence and education research in China can be divided into two development stages: gentle development stage (1984-2013): the first domestic paper (Wang Zhengxuan, 1984) was published in computer science journals, followed by three related articles published in education journals in 2003. In the early stage of research, computer science and education science have emerged as the core, and gradually evolved into the research trend of artificial intelligence curriculum as the core.

## 2. Slow Development Stage (1984-2013)

“Artificial intelligence and education and training” (1998) is an early article about the application of artificial intelligence in the field of education. Jin Jiakang discussed the influence of artificial intelligence technology introduced into education and training on promoting student-centered teaching mode. Zhang Jianping put forward the suggestion of adding artificial intelligence curriculum in the information technology curriculum system of middle school in the article “thinking about artificial intelligence education” (2003), so as to cultivate students’ information literacy more comprehensively. In “artificial intelligence and educational technology”, Zhang Hongjun proposed that the problems in distance education can be solved by combining the research field of artificial intelligence with distance education of educational technology. Qian Xusheng and Zheng He, in the book classification and hierarchical system construction of artificial intelligence education objectives of senior high school in China, put forward suggestions that the education objectives of artificial intelligence should be refined from the aspects of the characteristics of artificial intelligence discipline itself and the psychological development characteristics of senior high school students. Wang Haifang and Li Feng’s new progress in the application of artificial intelligence in education elaborated the research field of artificial intelligence application which was widely and actively applied in education in 2008 and the progress of its application in education. They believed that the development of science and technology would promote the breadth and depth of the application of artificial intelligence technology in education. Wu Jiyi and Ping Lingdi discussed how to introduce artificial intelligence technology into distance education and use the latest achievements of AI to improve the level of education in “Research on the application of artificial intelligence in Modern Distance Education” (2008). Xu Peng and Wang Yining combed and analyzed the application of artificial intelligence education in China from 2000 to 2008 in their article “current situation and Reflection on the application of artificial intelligence education in China”. They found that the papers on technology development accounted for more than half of the total papers in the application of artificial intelligence education in China, and the papers on practical application were less, Only 13% of the total number of papers. Zhang Jinghua and Han Pu discussed how to use the knowledge representation and reasoning method of artificial intelligence to solve the problem of lack of “teaching” in network education in the research on the application of artificial intelligence in Network Education (2014). After combing the core literature of artificial intelligence

and education research in the 30 years from 1984 to 2014, it can be seen that in the previous research, the combination of artificial intelligence and education is more technical or application problems than theoretical problems. At the same time, as the beginning of discipline integration, the initial research is not deep enough, and the related research in the field of higher education is very few.

### 3. Rapid Growth Stage (since 2014)

On the one hand, influenced by the international wave of artificial intelligence development, on the other hand, stimulated by the vigorous publicity, policies and capital investment at the national level, the number of papers published on artificial intelligence and education research increased sharply from 2015 to 2018, forming a research boom. However, the number of references decreased significantly, reflecting the weakening of objectivity and scientificity of the research to a certain extent. By the end of 2018, 93 papers have been published in the core journals (CSSCI and the overview of Chinese core journals), and 64 papers in 2018 alone. In 2017, there were 11 core articles about AI and education research with more than 1000 downloads, among which the four most cited articles are “building an ecosystem of” Ai + education (Wu Yonghe et al., 2017) and “exploration of educational application and innovation of machine learning from the perspective of AI” (Yu Minghua et al., 2017), the research on the development path of artificial intelligence education application in China in the era of Intelligent Education -- Interpretation and Enlightenment of the report “planning for the future, meeting the era of artificial intelligence” (Ma Yuhui et al., 2017), and the connotation, key technologies and Application trends of educational artificial intelligence (EAI) published in the Journal of distance education in January, 2017 (Yan Zhiming et al., 2017). Among them, the article “the connotation, key technology and application trend of educational artificial intelligence (EAI)” has important academic value, with more than 20000 downloads and 88 citations, which has inspired a group of researchers to carry out more in-depth thinking and Exploration on artificial intelligence. There are four research directions in this stage: (1) research on educational AI curriculum. Mainly around the artificial intelligence curriculum and education issues. For example, “new areas, misunderstandings, blind areas and forbidden areas in the application and research of artificial intelligence education” (Zhang Kunying et al., 2017), “Research on the interdisciplinary integration mode of stem based on the support of educational artificial intelligence” (Tang yewei et al., 2017). (2) Artificial intelligence vocational education research. It mainly focuses on the vocational education of artificial intelligence and the impact of artificial intelligence on vocational education, such as “strategies for the development of Vocational Education under the background of artificial intelligence” (Jiang Zhijian et al., 2017), “how to deal with the era of artificial intelligence in Vocational Education” (Zhang Qiwu, 2017). The development and dilemma of artificial intelligence education in China -- Also on the development of artificial intelligence in continuing education (Wang Yan, 2018), “Vocational Education under the background of artificial intelligence 2.0 and education informatization 2.0” (Yin Xiayu et al., 2018). (3) Research on educational artificial intelligence algorithm. It mainly focuses on the application of machine learning in education; For example, educational application and innovation exploration of machine learning from the perspective of artificial intelligence (Yu Minghua et al., 2017). Do machines need education? On general artificial intelligence and the innovation of Pedagogy (Liu Kai et al., 2018). (4) theoretical research on educational artificial intelligence. It mainly focuses on artificial intelligence and intelligent education. For example, stepping into the school 3.0 era: the trend and driving force of school evolution in the future (Zhang Zhi et al., 2017), artificial intelligence + education: the possibility and limit of technological change education (Meng Shirong, 2017), building an ecosystem of “artificial intelligence + education” (Wu Yonghe et al., 2017), artificial intelligence enabled education and learning (Jia Jiyou, 2018), and “Research outline of artificial intelligence in the field of education in China -- Based on the perspective of general artificial intelligence” (Liu Kai et al., 2018), “intelligent education: educational reform in the era of artificial intelligence” (Cao Peijie, 2018), “Research on the integration of artificial intelligence and education: a programmatic exploration” (Cai Lianyu et al., 2018), etc.

### 4. Conclusion

As a whole, the research on artificial intelligence and education in China is more qualitative and quantitative, normative and empirical. Secondly, from the content, the research field is not wide enough, and there are few researches on building a real intelligent teaching environment. Most of the examples

or quotations are limited to several “Star” cases, and the case of education is not enough. From the perspective of the academic segment and the school group, the research of higher education, adult education, vocational education and continuing education is the mainstream, and the research on primary, junior high and high schools is relatively few, and few people in early and pre-school education are interested in it. The research of vulnerable groups in society such as ethnic minorities, left behind children and disabled students is more rare. On the other hand, there are many cases of conceptual or semantic confusion caused by the nonstandard academic terms” The combination of the two core words of artificial intelligence and education has such potential risks. All of these problems need our attention and be improved in the future research.

## 5. Development Trend

From the beginning of the beginning of artificial intelligence in the field of education, the research on this problem mainly focuses on the application of artificial intelligence technology in different education levels and different subjects. The theoretical issues are less discussed. In view of the great development and change of AI technology in the next 20 years, we need to make a deeper and more farsighted study on the ethical issues of artificial intelligence and education. The existing achievements of the research on artificial intelligence and higher education in China are mostly concentrated on the macro design level. At the technical level, the application of AI technology is only at the basic level of intelligent system correction operation and remote synchronous teaching. Although the related technology level of AI is not poor, there is still a long way to go in the actual teaching. The application of artificial intelligence in the future will put forward higher requirements for technology, such as dynamic data collection and analysis of learners’ expression, push forward precise scheme for personalized teaching, construction of teaching virtual platform, intelligent teaching management, construction of intelligent campus, etc. In addition, although the field of “artificial intelligence + higher education” has been paid more attention in recent two years, there is still a relatively lack of relevant research on pedagogy and educational technology in this subject area. In the process of research and development of related “artificial intelligence education” technology, it is more from the perspective of technology, less from the perspective of education and management. These phenomena are all the problems that restrict the effective integration of artificial intelligence and higher education, but also an opportunity to promote the deep integration of AI technology and higher education.

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