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Research on the Reform Path of China's Postgraduate Education in the Era of Artificial Intelligence

Ying He, Qihong Wu*, Shanshan Gao, Xue Yu
Postgraduate Department, Chengdu University, Chengdu, Sichuan, China
**Corresponding Author.*

Abstract: This paper deeply discusses the opportunities and challenges brought by artificial intelligence technology to the current postgraduate education in China, and on this basis puts forward a series of reform paths and suggested measures. This paper analyzes the impact of artificial intelligence technology on the ecology of postgraduate education, especially the risks faced in the aspects of technology resource investment, the nature of education and academic ethics. Countermeasures and suggestions are put forward, including further implementing the fundamental task of cultivating talents, improving the quality of "AI +" postgraduate training, strengthening the ethical review of science and technology, and improving the artificial intelligence literacy of postgraduate tutors. The article stressed that in the face of the challenges brought by AI, China's postgraduate education reform needs to focus on the joint promotion of policy support, educational innovation and ethical norms, so as to cultivate high-level talents to meet the needs of future social development.

Keywords: Artificial Intelligence; Opportunities; Chanllenges; Postgraduate Education; Reform Path

1. Introduction

The rapid expansion of the new generation of artificial intelligence technology is profoundly affecting the ecology of domestic postgraduate education. From a technical point of view, the "discontinuation" of OpenAI in June 2024 has had a direct impact on the development of domestic large language models. Although China has made rapid progress on the standard large language model, the interruption of OpenAI's service, as a leader in the field, undoubtedly brings short-term challenges to domestic related research and application. However, this challenge has also prompted the country to accelerate the pace of independent research and development, thus promoting the independent development of domestic AI technology [1]. From the perspective of education and talent training, OpenAI's restrictions have further forced Chinese universities and research institutions to strengthen their independent innovation capabilities. In addition, the Ministry of Education has also clearly pointed out that intelligent technology should be used to accelerate the reform of talent training models and teaching methods. These measures show that domestic universities are gradually reducing their dependence on external technologies and improving their ability to train talents independently through the integration and innovation of internal resources [2]. This requires educators to adapt to these changes, but also need to continue to adjust and optimize the mode and content of education, in order to constantly adapt to challenges, including the realization of training objectives, professional curriculum Settings, scientific research processes and academic evaluation and other aspects of the changes [3].

2. Opportunities for AI-Empowered Postgraduate Education

2.1 Efficient Training Model

The application of artificial intelligence (AI) in postgraduate education is gradually driving the refinement and high-quality development of its training objectives. Through various evidence, experts generally believe that AI technology can bring about changes and opportunities in postgraduate education and have carried out practical explorations in many aspects. First, AI technology can

provide diverse and personalized ideological guidance and value cultivation, thereby promoting the all-round development of students. This personalized learning not only can tailor teaching to individual needs, but also can provide customized learning experiences based on students' learning situations and needs. Second, AI empowers the reform of the postgraduate education system framework, which is crucial. By applying intelligent technology, an efficient talent cultivation system can be established, enhancing the competence of teachers and students, exploring and practicing digital pedagogy, and conducting human-machine collaborative teaching in a compliant and orderly manner. At the same time, AI drives the reform of educational evaluation, by collecting and interacting with multi-modal data through AI technology, promoting the transformation of diverse evaluation methods in postgraduate education and achieving comprehensive evaluation. This not only helps improve the quality and efficiency of education, but also accelerates the digital transformation and upgrading of education. The application of AI technology in higher education has significantly changed traditional teaching modes. For example, by generating intelligent teaching content and personalized learning paths, it can better meet the learning needs of different students. The first batch of 18 "AI+ higher education" application scenarios released by the Ministry of Education showcases a variety of innovative teaching methods, such as intelligent tutoring systems and virtual laboratories, which provide strong support for reforming teaching methods. Third, AI not only plays a role in the teaching process, but also shows great potential in educational governance. By using AI technology, educational resources can be efficiently managed and optimally allocated, thereby improving the intelligent level of educational governance. This includes analyzing student behavior data, intelligently optimizing course arrangements, and dynamically allocating teaching resources. In the AI era, training innovative talents with new knowledge and values has become the ultimate goal of education. Through the application of artificial intelligence technology, flexible and diverse training modes can be established, such as personalized learning plans based on big data and interdisciplinary integrated projects, thus better adapting to the needs of the future society.

2.2 Diversification of Educational Resources

The AI-enabled production model of postgraduate education and teaching resources not only allows teachers to deeply participate in content co-creation, but also enables AI, big data, etc. to have a multiplier effect with students and teaching institutions, thus producing more professional, diverse, and interactive teaching resource content. Accordingly, a complete system framework will be established from the planning, creation, storage, dissemination, and ultimate acquisition of teaching resources by users. From monolithic to intelligent, the course format will shift from online and offline to virtual and real integration, and the future course content design should conform to the personalized customized knowledge model.

AI technology promotes the construction of multi-disciplinary knowledge systems, encouraging postgraduate students to acquire the ability to quickly obtain cross-disciplinary knowledge and integrate these knowledge to solve practical problems. This interdisciplinary training mode is conducive to cultivating high-level talents with innovative ability and comprehensive quality. The application of AI technology also drives the digitalization and democratization of educational resources. Through intelligent teaching assistants and online learning platforms, students can overcome the limitations of time and space and learn at any time and place. This greatly improves the accessibility and utilization rate of educational resources. The intelligent AI teaching assistant system at Southeast University uses artificial intelligence technology to provide comprehensive and personalized support for the teaching of "College Physics" course, providing teachers with intelligent management and personalized teaching support. It can provide corresponding learning resources and tutoring suggestions based on students' specific performance and understanding level. The "Zhejiang University Computer Science and Technology College Case - Smart Sea Platform" successfully

entered the first batch of "Artificial Intelligence + Higher Education" application scenario typical cases selected by the Ministry of Education. The platform uses artificial intelligence technology to combine knowledge point micro courses with personalized learning, improving the quality of higher education and the learning experience.

2.3 Diversification of Education Methods

The application of artificial intelligence technology has enabled postgraduate education to provide diverse teaching methods, shifting the teaching space from binary space to ternary space and learning methods from traditional learning to blended learning. For example, adaptive learning systems can arrange individualized courses based on students' learning habits and abilities, thus achieving individualized instruction. In addition, mixed reality and human-computer interaction technologies are also being applied in teaching, further enriching teaching methods. AI technology also has important applications in intelligent tutoring and evaluation. Intelligent tutoring systems can provide real-time feedback and guidance to students, helping them better grasp knowledge. Innovation in Education Content and Form: Artificial intelligence not only changes the content and form of education, but also drives a comprehensive reform of the education system. For example, generative AI can be used to cultivate postgraduate s' comprehensive abilities, including critical thinking, innovation ability, and cooperative ability. In addition, AI technology also promotes the construction of virtual laboratories and new types of laboratories, providing students with more practical opportunities. Artificial intelligence accelerates the digital transformation and upgrading of education. By using intelligent learning systems, virtual and real-world integrated learning environments, and intelligent educational assistants, educational institutions can better manage and optimize educational resources.

3. Challenges Faced by AI-Enabled Postgraduate Education

3.1 The Cost Risk of Technological Resource Investment

The cost risks faced by universities in the investment of AI technical resources are multifaceted, which mainly come from the aspects of technology research and development, infrastructure construction, human resources, data acquisition and management, market competition and policy environment [4]. Some scholars have clearly pointed out that the current artificial intelligence education should avoid falling into a simple "patchwork" talent training model, which deeply reveals the core challenges and development bottlenecks facing the current artificial intelligence education field. On the one hand, looking at many current postgraduate education systems, it is not difficult to find that the degree of digitalization and intelligence is generally not high, which seriously restricts the in-depth development of artificial intelligence education and the quality improvement of talent training. Therefore, it is urgent to introduce more advanced artificial intelligence technology to comprehensively improve the intelligence level of the education system, so that it can better adapt to the needs of future social development. However, this process does not happen overnight, it not only involves many challenges at the technical level, such as algorithm optimization, model improvement, data processing, etc., but also how to effectively integrate these cutting-edge technologies with the existing education system, so that they complement each other and jointly promote the leap in education quality. On the other hand, when many universities try to introduce AI technology, they are generally faced with the double limitation of technology and resources. Specifically, colleges and universities often need to invest a lot of money for the purchase and maintenance of advanced hardware equipment, such as high-performance computers, server clusters, etc., as well as supporting software systems. These high costs constitute a large burden for many colleges and universities. At the same time, the effective application of AI technology is not a simple technical deployment, it also needs a professional technical support team to be responsible for the daily maintenance of the system, troubleshooting and performance optimization and other work. At present, there

is still an obvious talent gap in many colleges and universities in this respect, and there is a lack of enough professional talents to support the smooth operation and sustainable development of AI technology, which undoubtedly further aggravates the difficulties and challenges in the process of promoting artificial intelligence education in colleges and universities. Therefore, how to efficiently integrate internal and external resources and train and attract more professionals in the field of AI under the condition of limited resources has become a key issue that colleges and universities need to solve.

3.2 The Risk of Alienation of the Nature of Education

With the wide application of artificial intelligence technology, the risk of alienation of the nature of education has gradually emerged. Artificial intelligence may lead to the loss of human subject status [5]. In the context of "education acceleration", AI technology provides highly personalized learning content based on data such as students' interests, learning habits and historical achievements, resulting in a narrow range of knowledge for students, limited to their own interests and existing knowledge system, and a lack of exploration of new fields and interdisciplinary knowledge. Algorithms exacerbate the problem of homogenization of knowledge dissemination. The high degree of automation of AI simplifies complex tasks, makes postgraduate s no longer need to master in-depth knowledge, and weakens the ability of independent learning and critical thinking. Over-reliance on AI will be detrimental to the cultivation of postgraduate s' abilities, such as innovation ability, communication and collaboration ability, complex problem solving ability, scientific research ability, etc., thus alienating the overall development goal of education. Artificial intelligence technology lacks the capture of individual students' emotional information and physical information, which makes it difficult to accurately realize humanistic care in teaching activities. This phenomenon is especially obvious in the use of generative artificial intelligence (AIGC), because this technology can replace the traditional teacher-student interaction, resulting in the special humanistic care and embodied experience in education can not be transmitted through the emotional interaction between teachers and students. Alienation of technology is another important risk. In the vision of "technological alienation", artificial intelligence will exert pressure on the essential power of human beings, making students and teachers increasingly dependent on machines, thus ignoring the intelligence and creativity of human beings themselves. In addition, artificial intelligence has enhanced the link of knowledge transfer in postgraduate education, but the empowerment of moral education and ability training is in a secondary position, which is not conducive to the realization of the fundamental task of education to cultivate morality and people.

3.3 The Risk of Credibility in Academic Ethics

With the rapid development of AI technology, some students have begun to make use of advanced natural language processing tools such as ChatGPT to write their papers, and even use AIGC technology such as Sora to complete their graduation projects, which has sparked widespread integrity concerns in the academic community [6]. The use of AI to write a dissertation essentially constitutes a form of academic misconduct, namely plagiarism or copying, which is a serious violation of the principles of academic integrity. Although many universities have explicitly banned such behavior and introduced relevant policies to restrict it, in practice, the ease with which AI tools can generate seemingly original content makes identifying and preventing such behavior a daunting challenge. UNESCO has taken this issue seriously enough to publish a Guide on the Use of Generative AI in Education and Research. The guideline makes it clear that generative AI models do not output results through in-depth observations of the real world and scientific forensics methods, so the texts they generate are open to question in terms of accuracy and authenticity. The intelligent model itself is not based on a true understanding of language and real society, and the content it generates often deviates from the value orientation of human society and is prone to misleading terms and discourse systems.

What is more serious is that if teachers and students who read and use AI-generated content choose to blindly rely on and trust without thinking and criticizing, it will inevitably bring great risks to the inheritance of knowledge, skills and values. This over-reliance on AI-generated content may lead to a trust deficit in academia, which in turn damages the reputation and authority of academic research. Therefore, universities and educational institutions need to strengthen academic integrity education for students, guide them to correctly understand and use AI technology, and ensure that the authenticity and innovation of academic research are not damaged. At the same time, the academic community also needs to establish a more complete supervision mechanism to effectively respond to the challenges brought by AI technology and maintain the justice and integrity of the academic community.

4. Countermeasures and Suggestions

4.1 Further Carrying out the Fundamental Task of Fostering Morality and Educating People

In order to respond to these challenges, postgraduate education in the new era needs to recognize that the acquisition of postgraduate professional knowledge has shown four major trends: "decentralization", the concentration of tutor's teaching content to "academic way", the trend of "flat" daily teaching management, and the academic assessment and evaluation break the "discussion culture". At the same time, it is necessary to take man-machine collaborative education as the core, reconstruct the teaching concept and teaching process of postgraduate students, timely adjust and pay attention to ideological and political education and academic ethics construction. First of all, it is necessary to promote the transformation of postgraduate education from attaching importance to knowledge imparting to ability cultivation. In the future postgraduate education, we should adhere to the fundamental task of fostering morality and educating people, and take ethics as an important content into the personnel training program. At the same time, knowledge of academic integrity, academic norms and scientific research ethics should be integrated into the whole process of postgraduate education by building artificial intelligence learning platforms, etc., and students' ideological and moral construction and value concept guidance should be strengthened, as well as policy publicity and public opinion guidance should be strengthened. In the future postgraduate education, emphasis should be placed on the organic integration of professional knowledge and application skills, so as to improve students' ability to analyze and solve problems.

4.2 Improving the Quality of "AI +" Postgraduate Education

In the era of artificial intelligence, the traditional teaching mode needs to be reshaped, and it is inevitable to explore and practice digital teaching method and man-machine collaboration teaching method. On the one hand, it is necessary to strengthen the training of artificial intelligence talents, in order to fully cope with the fierce competition of international and domestic scientific and technological innovation talents, improve the ability of self-cultivation of talents, cultivate innovative talents with international vision, innovation consciousness and team spirit, and provide strong talent support for the development of the country and society [7]. The Ministry of Education issued the Guiding Training Program for postgraduate Students in the field of Artificial Intelligence and clearly pointed out that it is necessary to actively build a long-term and stable training environment for interdisciplinary, broad fields and scientific research direction. This means that the boundaries of traditional disciplines should be broken in the training of postgraduate students in the field of artificial intelligence, and the integration and cooperation between different disciplines should be encouraged to form a diversified learning and research environment. On the other hand, to promote the reform of the "AI+" training model, the Ministry of Education's Action Plan on Artificial Intelligence Innovation in Colleges and Universities emphasizes the formation of a new model of "AI+X" composite professional training [8]. "Having the basic accomplishment of artificial intelligence and understanding the application path of artificial intelligence" has become the basic quality of

high-level top-notch innovative talents, and it is also the urgent requirement of China's social and economic development for high-level talents. Starting from 2024, a number of universities have announced that they will set up compulsory general courses on the theme of artificial intelligence, aiming to improve students' intelligent literacy and innovation ability.

4.3 Step up Ethical Review of Science and Technology

At present, China has issued the Measures for the Ethical Review of Science and Technology at the national level, which brings scientific and technological activities involving artificial intelligence into the scope of supervision, and standardizes the ethical review of scientific and technological research and technological development activities. This means that all research projects using AI need to go through strict ethical review to prevent potential ethical risks. Universities in many places have announced that they will introduce essay testing tools to address the challenges posed by AI ghostwriting. The ministry also stressed the importance of strengthening education on academic ethics and academic integrity to prevent academic misconduct. Various academic research platforms have launched the AIGC detection function, which takes text as test object and uses AI to quickly and accurately identify whether academic text is partially or completely generated by AI model, to provide strong support for guiding and supervising researchers to use AIGC technology scientifically and reasonably, maintain academic integrity and protect knowledge innovation [9]. Universities should enter relevant platforms scientifically and reasonably, further regulate academic ethics, and avoid academic moral problems [10].

4.4 Improve the Artificial Intelligence Literacy of Postgraduate Tutors

postgraduate tutors should seize the opportunities brought by the era of artificial intelligence, accurately grasp the characteristics and trends of artificial intelligence, promote innovation in teaching and research, and think about future-oriented interactive forms. First of all, tutors need to understand and master the latest development trend of artificial intelligence, timely grasp the frontier trends of AI disciplines, and give back to teaching and research. For example, generative artificial intelligence, large model technology, and AI-on-5G are all important trends that deserve attention at present. Second, tutors should actively use AI to empower teaching and research. For example, teaching quality and efficiency can be improved through intelligent diagnosis systems, personalized learning tools and efficient recruitment of course resources. Tutors should focus on the specific application of AI in education. For example, the report on "AI Empowers College Teachers' Teaching and Research Innovation" held by Shanghai Dianji University aims to promote the deep integration of AI with teaching and research, and enhance teachers' teaching level and scientific research and innovation ability.

5. Conclusion

Through the exploration of the reform path of China's postgraduate education under the background of artificial intelligence, this paper systematically analyzes the opportunities and challenges brought by artificial intelligence technology to postgraduate education, and puts forward a series of suggestions to promote the deep integration of artificial intelligence and postgraduate education: Artificial intelligence technology has a far-reaching impact on postgraduate education, which not only provides new opportunities for postgraduate education, but also brings a series of challenges. These challenges include the cost risk of the investment of technical resources, the risk of alienation of the nature of education and the risk of the integrity of academic ethics. In the face of the challenges brought by artificial intelligence, the reform of China's postgraduate education is particularly urgent. The direction of reform should focus on the implementation of the fundamental task of cultivating virtues and talents, improving the quality of AI + postgraduate training, intensifying the ethical review of science and technology, and improving the artificial intelligence literacy of postgraduate tutors. These measures aim to ensure the quality and effectiveness of postgraduate education, while protecting

academic integrity and ethics.

To sum up, the development of AI technology is changing with each passing day, and China's postgraduate education reform in the context of AI is a complex and multi-dimensional process that requires policy support, educational innovation and ethical norms to advance together. Educators and scholars need to constantly adapt to technological developments and update educational concepts and teaching methods to cultivate high-level talents who can adapt to the needs of future social development.

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