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Frontiers of Intelligent Education: Artificial Intelligence Reshaping the New Landscape of Chinese Higher Education

Mingzhi Dai[1]

[1] School of Electronic and Computer Engineering, Peking University Shenzhen Graduate School, Shenzhen, Guangdong, China
Correspondence: Mingzhi Dai, School of Electronic and Computer Engineering, Peking University Shenzhen Graduate School, Shenzhen, Guangdong, China.

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Abstract

The development of AI technology has not only changed people's social production and lifestyle, but also gradually entered the field of higher education, triggering numerous changes in teaching and learning in Chinese higher education. AI provides students with personalised and immersive learning experiences, as well as teachers with new assistance in teaching strategies, curriculum design, student assessment and management. At the same time, there are some problems with the application of AI technology in higher education, which puts forward higher requirements for teaching in higher education. The purpose of this paper is to discuss the role of AI technology in higher education teaching and further explore the direction of its development.

Keywords: artificial intelligence, higher education, machine learning

1. Introduction

The concept of Artificial Intelligence first arose at the Dartmouth Conference in the United States in 1956, where Dodigovic (2007) defined AI in his article:

"Artificial intelligence (AI) is a term referring to machines which emulate the behaviour of intelligent beings [...] AI is an interdisciplinary area of knowledge and research, whose aim is to understand how the human mind works and how to apply the same principles in technology design. In language learning and teaching tasks, AI can be used to emulate the behaviour of a teacher or a learner [...]" (p. 100).

The application of artificial intelligence technology has greatly changed the way of life of people who only rely on individual thinking, making people achieve the linkage of "internal brain" and "external brain" through smart phones or computers, and thus have the characteristics of human-computer integration. As a social field, higher education is inevitably affected by AI technology, which will be fully integrated into the higher education system in the foreseeable future, profoundly changing the operation mechanism of Chinese higher education.

Internationally, there is also a growing discussion about AI in the social and academic

spheres. The UNESCO 2021 Strategy for Technological Innovation in Education (2022-2025) aims to strengthen the examination of emerging and future technological changes and their impact on education, and to support Member States in developing distance learning platforms, learning tools, open educational resources, and their effective methods of facilitating learning, in order to contribute to equitable and inclusive quality education and lifelong learning opportunities for all.

In the Horizon Report 2021 (Teaching and Learning Edition) released by the American Society for Information Technology in Higher Education, AI technology, along with mobile learning, analytics, mixed reality, blockchain and virtual assistants, are considered to be the six key technologies that will affect higher education in the future, so Chinese colleges and universities should follow the trend of technological development, actively use the convenient tools brought by science and technology, and cultivate teachers' and students' ability to use AI technology, and cultivate talents who can correctly use AI technology to meet the needs of social development.

2. Artificial Intelligence Promotes the Change of Talent Training Concepts

2.1 Development of Talent Training Concepts: From Standardisation to Personalisation

In the 1990s, China's higher education gradually began to move towards mass education, and has established the world's largest higher education system, becoming a real education power. However, while pursuing the expansion of scale, higher education is facing the problem of "big but not strong", which is mainly reflected in the lack of innovation capacity, leading to the problem of homogenisation of higher education in general, and the lack of characteristics and differences.

In the face of this challenge, there is an urgent need to transform the concept of talent training in higher education. From the traditional "standardised" teaching model to a "personalised" talent cultivation strategy. In this process, AI technology provides technical support to provide customised learning content and learning paths for each student. Qiu Xin (2024), a professor at Fudan University, pointed out that Fudan University is committed to promoting the application of AI in the fields of scientific research (AI for Science) and social science (AI for Social Science). By combining "scientific big data, large-scale arithmetic power and high-efficiency models", it can identify good scientific problems in huge amounts of data. It can be seen that in the application of AI in universities, AI can help learners to quickly discover "personalised" and "specialised" scientific problems, thus contributing to major breakthroughs in research.

The application of intelligent systems and tools is gradually promoting the concept of personalised learning, and Chinese universities can use technologies such as knowledge graphs, adaptive learning and cognitive computing engines to achieve personalised matching of learning resources. The corresponding AI tools can provide customised learning strategies based on learners' ability levels, needs and goals, and give full play to the potential of data analysis and cognitive computing to enhance learning outcomes. In addition, while promoting "personalised" education, university classrooms should also be "flexible" and "interactive", using AI technology to establish virtual labs, organise online seminars and project-based learning, and promote student learning. The use of AI technology to set up virtual labs, organise online seminars and project-based learning promotes communication among students and cooperation between teachers and students, and enhances students' initiative and creativity in learning.

2.2 Development of Talent Training Concepts: From Basic to Digital Qualities

The basic qualities of human resources training refer to good moral character, solid subject knowledge, and the life skills and social skills needed for daily life. These qualities were the focus of higher education in the past. However, in the context of the rapid development of the digital economy and information technology, the social requirements for talents have undergone a major shift. This requires the higher education system to place more emphasis on the cultivation of digital qualities while ensuring that students have basic qualities. Digital quality is not only designed as the skills to learn and operate modern digital tools, but also includes the ability to understand, analyse and effectively use data and information, as well as the ability to think critically and solve problems in a digital environment. In order to enhance the digital quality of students, higher education should take a variety of measures, which are listed

below:

Firstly, updating and enhancing curriculum content related to digital technologies, such as programming languages, cybersecurity, data science, etc.; secondly, adopting blended learning and online platforms to enable students to learn and apply digital tools in practice; thirdly, strengthening collaboration with the industry in order to provide real-life examples and internships to enable students to hone their digital qualities in real-life environments; fourthly, guiding students to engage in cross-disciplinary learning and encouraging the use of digital technologies to explore knowledge and issues in different fields; and fifthly, to develop students' awareness of lifelong learning so that they understand the importance of continuous learning in the digital age. Through these approaches, higher education institutions can help students not only to acquire the necessary knowledge and skills, but also to play a leading role in leading innovation and change in the digital society of the future.

3. Artificial Intelligence for Changing Teaching Models

3.1 Changes in the Education Model: From Equalisation to Refinement

The development and application of artificial intelligence technology is driving the education model from traditional balanced teaching to more refined teaching. This will not only meet the individual needs of students more precisely, but also improve the quality and efficiency of teaching. Teachers and students need to be familiar with online learning, blended learning and the adoption of various learning and management systems based on AI technology (Yin, 2022).

3.1.1 Intelligent Lecturing and Precision Teaching

AI technology can dynamically adjust the content and difficulty of instruction based on students' learning history and performance. For example, intelligent teaching platforms can analyse students' mastery of specific concepts and adjust the pace of lessons in real time to accommodate different students' rates of understanding. Intelligent delivery systems can also provide media-rich teaching resources such as videos, simulation experiments and interactive exercises to enhance students' learning experience.

3.1.2 Intelligent Q&A and Counselling

Q&A and tutoring are important extensions of classroom teaching, unlike the traditional classroom model of face-to-face learning. Artificial intelligence technology breaks through the limitations of time and space, allowing students to answer questions and provide counselling through access at any time and any place. Low-order intelligent robots are able to preset answers and give accurate and effective responses quickly. Higher-order AI robots can also act as external brains or databases to provide students with one-on-one Q&A and counselling services, which can provide resources such as videos of lectures by master teachers, scientific research articles, case studies, etc., and help students to understand cutting-edge scientific research. Through AI technology, students can improve their problem-solving and problem-analysis skills, and gain a broader academic perspective.

In addition, artificial intelligence can also collect students' learning data, understand students' learning habits constantly improve the accuracy of its own question-answering work, and give personalised learning knowledge, which undoubtedly improves the students' enthusiasm for learning and promotes the improvement of students' scientific research professional level.

3.1.3 Intelligent Student Assessment

In the age of artificial intelligence, student-centred assessment systems are increasingly becoming mainstream, and real-time learning assessment has become an important reference for teaching and curriculum instruction. With the help of AI technology, teachers are able to monitor the range of learning indicators, can apply neural network and deep learning techniques to analyse learning motivation, use dynamic cognitive computing models to diagnose the learning situation, and assess emotional fluctuations in the learning process with the help of sentiment analysis techniques.

In addition, learning assessment methods will become more precise. Artificial intelligence technology extends assessment to all aspects of learning, such as using knowledge graphs to build personalised learning maps to optimise diagnostic assessment; using intelligent recommendation technology and learning process data to customise learning paths and improve process assessment; and using

clustering algorithms and user profiling technology to create learner models and improve outcome assessment. The application of these technologies makes learning assessment more effective and personalised, providing protection and support for the growth and development of each student.

3.1.4 Smart Administration

In addition to changes in teaching, artificial intelligence also plays an important role in the administrative management of colleges and universities. Traditional administration often requires a large number of paper documents and human resources, while the introduction of AI technology can improve the efficiency of university administration.

First of all, university administration needs to analyse a large amount of data, such as student enrolment statistics, course arrangements and staff deployment. Artificial Intelligence technology can process the huge amount of data and extract valuable information from it, which can help college administrators to make more scientific policies and plans.

Secondly, the administrative management of colleges and universities involves numerous processes, such as enrolment, registration, course selection, graduation audit and so on. Traditional process management often requires a lot of manpower and time, and is prone to cumbersome procedures and information loss. With the help of AI technology, automated process management and intelligent information processing can be achieved. For example, through automated enrolment systems and automatic entry of students' results, manual operations can be reduced and work efficiency and accuracy can be improved. Feng, Zhou and Liu (2011) analysed enrolment data from 25 provinces in China as training data and used artificial intelligence networks (ANN) to simulate and predict enrolment rates in other provinces, and the study demonstrated that simulation predictions were more accurate. Artificial intelligence tools can certainly reduce the burden on staff and allow them to focus more on specificity.

In addition, AI technology can be used to establish an intelligent monitoring system to achieve real-time monitoring of the campus environment and early warning of abnormal events through technologies such as image recognition and behavioural analysis. Meanwhile, in terms of network and information security, AI technology can be applied to intrusion detection, data encryption and user behaviour analysis to protect the information resources of colleges and universities and students' personal privacy.

3.2 Artificial Intelligence for Learning Paradigm Change: From Traditional to Convergent Learning

Artificial Intelligence interventions are driving a gradual transformation of the learning paradigm from traditional passive receptive learning to active integrative learning, where personalisation, flexibility and self-drivenness are key features. The following are some of the key developments in convergent learning:

3.2.1 Adaptive Learning

Artificial intelligence can use big data analytics to gain insight into a student's specific learning profile, including their learning styles, strengths, weaknesses, and areas of interest. With this understanding, AI is able to customise course content exclusively for each student. In adaptive learning platforms, AI applications make educational resources more flexible and interactive.

The platform is able to automatically adjust the content and difficulty of instruction based on real-time student feedback, ensuring that students are always learning at an appropriate level of challenge, and are neither frustrated by over-challenge nor disengaged by under-difficulty. Schiaffino et al. (2008) describe an artificial intelligence system, E-Teacher, which provides personalised assistance to e-learning students by observing their behaviour during the course and generating student profiles to provide personalised assistance to e-learning students, which can recommend reading materials and exercises based on the student's level and generate personalised learning programmes. Jeschike et al. (2007) refer to intelligent assistants in a virtual laboratory for statistical mechanics, which can provide exercises and assessment of the learner's input content, as well as interactive lesson adapted to the learner's materials.

Overall, AI shows great potential and benefits in higher education through big data analytics. It can provide insights into students' learning, including their learning styles, strengths, weaknesses and areas of interest, and use this information to tailor personalised study routes to maximise each student's learning outcomes.

3.2.2 Lifelong Learning

Artificial intelligence-powered online learning platforms such as Massive Open Online Courses (MOOCs) offer a wide range of courses from the world's leading universities and institutions, covering a wide range of disciplines from computer science to psychology and from basic education to professional skills training. Training. Learners can choose suitable courses for further studies according to their personal career plans and interests.

Meanwhile, AI analytics tools can help users monitor learning progress and develop learning plans. Machine learning algorithms can recommend courses and career paths to ensure that what is learnt meets both market demand and personal career goals. In this way, learners can keep abreast of new knowledge and gain insight into future career trends and skill requirements, so they can make targeted learning choices.

For working people, the time and financial costs of acquiring the skills needed for career development can be minimised by taking short courses, professional certificate courses or postgraduate courses through an online platform. This type of learning greatly enhances the convenience of learning. It allows working professionals to continue their self-learning and growth even in the midst of their busy work and life schedules.

With the help of artificial intelligence, learning has become more efficient, providing learners with a cross-disciplinary, full-cycle learning experience. This model of education not only simplifies the learning process, but also fulfils the modern need to acquire new skills quickly. Together, AI and online learning platforms pave a solid path for lifelong learning, and such an environment enhances learners' ability and motivation to continue learning, laying a solid foundation for them to seize opportunities and meet challenges in the future society.

4. Challenges to the Use of Artificial Intelligence in Higher Education in China

Higher education in China faces several challenges when using AI technology. According to a research study conducted by Professor Hongbiao Yin (2022) on 3,999 undergraduate students at a research university, students experienced superior academic outcomes and learning environments in face-to-face synchronous interactions, as well as demonstrated higher levels of satisfaction than in online asynchronous teaching environments. These findings imply that although AI facilitates innovation in teaching and learning paradigms, there is still a need to overcome some of the inherent advantages and achieve student acceptance in real-world teaching and learning environments. Exploring this further, the challenges of AI applications in education also include:

4.1 Technology Integration and Professional Training

The transformation brought about by the use of AI technology in education, while full of potential, does require overcoming a number of technical and practical hurdles. Using AI systems on campus on a large scale requires careful pre-planning and financial support from the government. On top of that, schools need to hire a dedicated IT team to take care of maintaining and updating the system. At the same time, college-heavy teachers must be trained on how to make the best use of AI tools to improve the teaching and learning process. Students also need to be properly guided and educated so that they can confidently use these tools and understand and adapt to the changes in learning styles brought about by AI.

4.2 Issues of Equity in Education

The introduction of AI may deepen the unequal distribution of educational resources. Universities located in developed regions have more adequate financial support to allow them to introduce modern teaching and learning facilities represented by AI tools. Colleges and universities located in remote or more economically disadvantaged areas may not be able to bear the cost due to financial constraints and outdated infrastructure. This situation creates unequal access to AI educational tools for students in colleges and universities around the world, which can have an impact on students' learning outcomes and future development opportunities, and may lead to social stratification and brain drain in some regions.

In order to address this gap, concerted efforts by the Government and all sectors of society are needed. On the one hand, the Government needs to exercise macro-control and formulate relevant policies to provide the necessary financial support to universities in remote areas; on the other hand, the sharing of knowledge and experience within the education system can be

facilitated through the organisation of seminars, workshops and distance-learning conferences. By making use of the existing online resources and platforms, we can also provide students in remote or economically backward areas with quality education content. Only through such efforts can we try to ensure that students everywhere have the opportunity to use high-tech tools such as artificial intelligence to enhance their learning experience and effectiveness.

4.3 Ethics and Definition of Responsibilities

The use of AI tools in higher education may lead to a number of ethical and responsibility-defining issues, specifically encompassing fairness, transparency, bias, and privacy. As AI systems collect and process a large amount of students' personal data, including sensitive information such as grades and study habits, students may be concerned about the potential discrimination issues resulting from the inappropriate use of such data, such as access by teachers (Li, 2007).

Because AI systems usually make decisions based on data, if the raw data itself has some bias, the conclusions drawn by the AI will inevitably be biased, which in turn will have a negative impact on specific groups of students. In addition, the operation mode and calculation process of AI lacks the necessary transparency, which may lead to some teachers and students having difficulties in understanding or even questioning the decision-making process of AI.

To address these issues, colleges and universities should develop clear regulations and standards to provide guidance and assistance to students and teachers using AI tools in education. At the same time, faculty or faculty committees should retain the final interpretation of evaluations and decisions to ensure that AI is only an assistive tool and not a substitute for decision-making by administrators and educators in colleges and universities. HEIs need to ensure that the use of AI tools does not violate students' privacy rights, that sensitive data is handled appropriately, and that the process of collecting, storing and analysing student data is strictly regulated. Teachers and students should be fully informed of the types of data collected by AI systems, the purpose of their use, and how the data will be processed, to ensure that the security of their personal information and their right to privacy are respected.

4.4 Balance Between the Use of AI Technology and Humanities Education

It is important to find a balance between AI technology and traditional humanities education. It is true that technological innovation can improve the quality of teaching, but we must not neglect the education of students in critical thinking, mental health and social skills. Colleges and universities should promote technological innovation while balancing the relationship between technological application and humanistic care, actively promoting the development of students' comprehensive quality, and creating an environment where AI can be used to enhance personalised learning experiences while focusing on students' humanistic education.

In summary, the challenges we face in integrating AI technology into Chinese higher education include issues such as technology integration and professional training, equitable distribution of educational resources, handling of ethical and liability issues, and the maintenance of AI technology and humanities education. In order to address these challenges, universities need to formulate relevant policies, rationally allocate resources, strengthen professional training, and conduct regular reviews of AI applications. Through such comprehensive measures, we can fully enjoy the convenience and efficiency brought by AI tools while ensuring that traditional humanistic values and basic principles such as educational equity are respected and reflected.

5. Conclusion

This paper comprehensively discusses the transformation that AI may bring in the field of higher education in China, and analyses in detail the main challenges that AI promotes the change of talent cultivation concepts, promotes the innovation of teaching and learning modes, and faces in practice in higher education. With the increasing maturity and popularity of AI technology, its potential in education is gradually emerging, bringing fundamental changes from standardisation to personalisation and from basic to digital quality to the traditional talent cultivation model. The application of AI in teaching and learning modes has realised the evolution from balanced to fine-tuned, and improved the efficiency, effectiveness, and fairness of education through the intelligent lecturing system, intelligent

question-answering and tutoring, intelligent student evaluation, and intelligent administrative management. efficiency, effectiveness and fairness of education.

In addition, AI technology has also driven the transformation from traditional to convergent learning, and modes such as adaptive learning and lifelong learning are gradually replacing traditional classroom teaching, providing learners with more flexible, personalised and continuous learning pathways. However, despite the many advantages that AI brings, Chinese higher education is also facing multiple challenges in its application, such as technology integration, educational fairness, ethical responsibility, and maintaining humanistic care.

We must realise that the core values of humanistic education should be maintained while using AI technologies to reform education. Continuous change in higher education requires a comprehensive consideration of the dynamic balance between technology, people and policy, as well as the establishment of a sound regulatory framework to ensure that educational innovations can move forward steadily on the basis of ensuring quality, accessibility and ethics. In conclusion, AI technology offers infinite possibilities for the development of higher education in China and around the world, and the key lies in how we can intelligently respond to the challenges and grasp the opportunities, so that it can become a powerful driving force for social progress and the cultivation of future innovative talents.

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