

# The Innovation and Reform of Higher Education Teaching Mode Under the Empowerment of Artificial Intelligence

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**Abstract:** With the rapid development of information technology, artificial intelligence (AI) is promoting the digital transformation of higher education. Chinese and American universities show different characteristics in the application of artificial intelligence. China pays attention to the systematic construction, and the United States focuses on the introduction of frontier technologies. Through the innovative application of intelligent "teaching" and "learning", artificial intelligence has greatly promoted the reform of university teaching mode and improved the efficiency and quality of teaching. However, this process is also facing the challenges of digital divide, education alienation, immature technology and personal information security. Therefore, it is recommended that the government narrow the digital divide and speed up the technology update. Colleges and universities should cultivate teachers and strengthen policy and legal safeguards to realize the good integration of artificial intelligence and higher education.

**Keywords:** Artificial Intelligence; Higher Education; Teaching Model

Digitalization and intellectualization have become the key forces to promote the leapforward development of science and technology, the optimization and upgrading of industrial and social governance, and the overall leap of productivity in China. In this context, education digitalization has become an important breakthrough to open up a new track and shape new advantages of education development in China. In recent years, the application of artificial intelligence in the digital transformation of higher education has grown rapidly, which has triggered profound changes in the digital transformation of

education. In-depth research on the empowerment of artificial intelligence in higher education is crucial to promote the process of education digitalization and ensure the correct play of the empowerment value of artificial intelligence in it.

## 1. The Current Situation of Artificial Intelligence Promoting the Development of Higher Education

Artificial intelligence is promoting the development of higher education. The current situation of Chinese and American universities is different. China pays attention to systematic construction, and the United States focuses on the introduction of frontier technologies, and the two jointly explore the integration of artificial intelligence and education.

### 1.1 Current Situation of Chinese Universities

Under the background of digital transformation, Chinese universities are more inclined to carry out systematic construction and education reform in the application of artificial intelligence, pay more attention to how to deeply integrate AI into their own education and teaching system through a series of plans, and promote the wide application of AI in education through long-term construction, which fully reflects the needs of localization.

#### 1.1.1 Peking University

In February 2024, Peking University released an AI teaching assistant tool called "Brainiac Buddy". The tool was developed based on GPT-4 with the purpose of achieving personalized, customized and interactive teaching, and has been applied and promoted in the classroom. Students can preview the course by asking questions to it, and establish their own personalized database, so as to improve the teaching efficiency.

### 1.1.2 Shanghai Jiao Tong University

In June 2024, Shanghai Jiao Tong University released the "Artificial Intelligence + Education and Teaching" action plan of Jiao Tong University, focusing on the construction goal of "1+12345+N". Among them, "1+12345+N" represents the construction of 1 AI major, 10 AI+ majors, 20 AI+ micro majors, 30 AI+experimental and practical projects, 40 digital textbooks, 500 AI+ courses, and N AI enabled teaching applications. The implementation of this plan aims to promote the deep integration of artificial intelligence with teaching, practice and management.

## 1.2 Current Situation of American Universities

American universities pay more attention to the introduction of cutting-edge technologies and the application of innovative tools. Benefiting from the fact that the United States has the world's top technology companies, they are more inclined to quickly introduce and apply the latest AI tools and technologies through deep cooperation with top technology enterprises. At the same time, American universities may have a more open international perspective on the integration of AI and education.

### 1.2.1 Arizona State University

Arizona State University formed a comprehensive strategic partnership with OpenAI in January 2024 to use ChatGPT Enterprise for many purposes, including course teaching, tutoring, and research. In May 2024, Arizona State University became the first university in the world to use ChatGPT for Education when it was released.

### 1.2.2 Georgia Institute of Technology

In April 2024, Georgia Tech partnered with NVIDIA to create AI Makerspace, an artificial intelligence supercomputer center dedicated to teaching, providing students with access to advanced computing resources typically available only to researchers or tech companies.

## 2. The Innovation of University Teaching Model Empowered by Artificial Intelligence

Artificial intelligence technology promotes the reform of teaching mode in colleges and universities through the innovative application of teaching and learning. For students, it opens a new path of personalized learning. For

teachers, artificial intelligence provides new teaching tools and methods.

### 2.1 Innovation of Intelligent "Teaching"

#### 2.1.1 Application of Artificial Intelligence Technology Serving Students

The purpose of college education is student-centered. The application of artificial intelligence technology for students can serve students well, improve learning efficiency, provide personalized learning plans, and teach students in accordance with their students' abilities.

##### (1) AI personal assistant

AI personal assistant can customize personalized learning plans according to students' habits and their own learning situations. Compared with the traditional way of fearing the teacher and asking questions limited by the teacher's time, the AI personal assistant is online 24 hours a day, and students can get timely answers even in the early morning, which greatly promotes the learning efficiency and reduces the burden on teachers.

##### (2) AI emotion

AI emotion helps students in mental health and emotional care. By intelligently analyzing students' emotional intonation and recent learning behavior, it can identify students' possible stress, anxiety and other problems, and provide timely advice on ways to relieve stress or guide students to seek psychological counseling services such as the university hospital.

#### 2.1.2 The transformation of teachers' roles

In the traditional school education, teachers as the leader of teaching, teaching efficiency is low, teachers mechanical affairs heavy, lack of teachers' own growth and training. However, with the introduction of AI technology, the role of teachers has gradually been separated from a single knowledge transmitter to a learning guide and supporter.

### 2.2 Intelligent "Learning" Innovation

#### 2.2.1 Application of artificial intelligence technology to assist teachers

Through the application of artificial intelligence technology, the classroom teaching mode changes from teacher leading to teacher +AI assisting and teacher +AI participating. In the future, teacher +AI collaboration, teacher +AI integration, and even classroom completely dominated by AI

may become a reality<sup>[1]</sup>.

#### (1) AI teaching assistant

At present, AI teaching assistants do not completely replace human teachers, but as an auxiliary tool to help teachers complete some tedious repetitive work, such as helping teachers organize course materials, arrange schedules, provide data translation, etc., and can also help teachers quickly complete structured work, such as providing a piece of program code. However, the learning effect achieved by students with the aid of AI teaching assistants still needs the pre-guidance and post-guidance of human teachers.

#### (2) AI intelligent correction

AI intelligent grading can complete automatic grading of assignments, especially multiple-choice and fill-in-blank questions with fixed answers, and it can quickly process a large number of assignments, exams, or quizzes in a short period of time. Compared with teachers' manual grading, AI intelligent grading undertakes a lot of tedious and repetitive grading tasks for teachers, which greatly reduces teachers' work burden and allows teachers to devote more energy to teaching itself.

#### 2.2.2 The transformation of students' roles

AI technology empowers students with more autonomy and choice through forms such as blended teaching and generative AI. Students will change from passive recipients of knowledge to active learners of knowledge, which meets the personalized needs of students. Students can also study around the clock, breaking the time and space limitations of traditional education.

### 3. Challenges of Artificial Intelligence Empowering Higher Education

Artificial intelligence-enabled higher education faces many challenges, such as digital divide, education alienation, immature technology and personal information security issues, which need to be solved urgently to realize the good integration of education and science and technology.

#### 3.1 Increasing the Digital Divide

The widespread application of AI technologies may further exacerbate the digital divide problem in higher education. The imbalance of computing power and resources in different countries and regions is very serious, which

may lead to some economically underdeveloped areas or students not being able to enjoy the educational resources brought by AI technology fairly<sup>[2]</sup>. It has actually greatly affected the realization of educational equity.

#### 3.2 Educational Alienation

Some students are too dependent on and addicted to the convenience brought by generative artificial intelligence technology, but too much trust in the results of artificial intelligence will make students lack of independent thinking ability. Students seem to be able to carry out independent and personalized learning, but because of their own self-discipline ability is often insufficient, they are easy to be controlled by the algorithm. Some students even use AI tools to complete assignments or research projects, which may be related to academic misconduct<sup>[3]</sup>. At the same time, students' excessive reliance on artificial intelligence will exacerbate the reduction of communication with teachers, which is likely to lead to a decline in teacher-student relationship.

#### 3.3 The Technology Side is Still Immature

Technically, artificial intelligence is not fully mature. An example is the large model illusion problem, where the model may output incorrect information<sup>[4]</sup>. At the learning stage, it is difficult for students to judge what is wrong information by their own experience. Secondly, some general big models have limited understanding of some specific professional domain knowledge, and their answers cannot meet students' needs or even are wrong.

#### 3.4 Security and Protection of Personal Information

When colleges and universities use artificial intelligence technology, they often need to rely on a large amount of data for training, and the data source involves students' personal information, which brings multiple challenges such as privacy protection and data security. Although the collection and analysis of students' data is helpful for the design of personalized learning, it also causes the problem of data abuse.

### 4. Suggestions for Promoting Artificial

### **Intelligence to Empower Higher Education**

In order to continuously promote the empowerment of artificial intelligence in higher education, it is necessary to narrow the digital divide, accelerate the technology update, cultivate teachers, and strengthen policy and legal protection.

#### **4.1 Narrowing the Digital Divide**

The government should invest more resources to help economically underdeveloped areas improve the network infrastructure and favor them in terms of computing power, ensure that teachers and students in underdeveloped areas can enjoy the educational resources brought by AI, and provide free AI learning resources to students with financial difficulties when necessary to promote educational equity.

#### **4.2 Speed up Technology Update**

The accuracy of generative artificial intelligence still needs to be improved, especially in higher education, which usually has limitations in professional fields. This requires teachers and students in colleges and universities to work together to fine-tune the large model to adapt to their own professional needs, including but not limited to using knowledge graph, retrieval enhancement and other technologies to build their own professional discipline engine.

#### **4.3 Training of Teaching Staff**

With the wide application of AI technology in teaching, the cultivation of teachers has become particularly important. Schools should fully recognize this trend and provide continuous training for teachers on a regular basis. Through professional training courses and practical activities, teachers can deeply understand the characteristics and advantages of AI technology, master how to effectively apply it to teaching.

### **4.4 Strengthen Policies and Laws to Protect Privacy**

It is necessary for the government to formulate relevant laws and regulations to clarify the principles and scope of AI technology in collecting personal information in colleges and universities, so as to provide guidance for schools to follow. It is also necessary for schools to strengthen artificial intelligence education, incorporate data ethics, security education and academic integrity education into compulsory courses, improve the awareness of data ethics of teachers, students and staff to ensure the safety and control of technology.

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#### **References**

- [1] Liang Zheng ,He Jiayu .AI enabled Education: application status and future prospects[J].People's Education,2023,(09): 21-26.
- [2] Zheng Yibei,Cao Hui .The ethical worries and Transcendence of the application of artificial intelligence in Education [J/OL].Teaching and Management,1-8 [2024-10-14].<http://kns.cnki.net/kcms/detail/14.1024.G4.20240929.1616.002.html>.
- [3] StrzeleckiA ,ElArabawyS .Investigation of the moderation effect of gender and study level on the acceptance and use of generative AI by higher education students: Comparative evidence from Poland and Egypt[J].British Journal of Educational Technology,2024,55(3): 1209-1230.
- [4] Krzysztof W ,Wojciech C .Challenges for higher education in the era of widespread access to Generative AI[J].Economics and Business Review,2023,9(2):71-100