

# Research on the Path of College Education and Teaching Reform Driven by Artificial Intelligence

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**Abstract:** With the development of intelligent education and teaching in colleges and universities, the mixed teaching mode of online and offline has become the focus of current college education and teaching reform. From the perspective of concepts and technologies related to online teaching, as well as teachers and students involved in online teaching, there are still problems in online teaching in Chinese universities, such as insufficient interaction between teachers and students, weak autonomy of students' learning, insufficient mastery of new technologies by teachers, and imperfect online teaching platforms. The emerging information technology with AI as the core not only helps to improve the learning experience and teaching efficiency but also plays an important role in realizing personalized learning and improving students' awareness and ability of autonomous learning. This paper studies the problems existing in the online teaching process of Chinese colleges and universities and probes into the education and teaching reform path in colleges and universities based on artificial intelligence technology.

**Keywords:** Artificial intelligence, Higher Education, Reform in education.

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## 1. Introduction

China has been promoting the modernization of college education for a long time, and online teaching based on Internet technology is an essential embodiment of the modernization of college education. Online teaching refers to the computer Internet technology unique to the information age in the teaching process to impart the knowledge originally imparted in the classroom to students through the network in a more convenient, fast, and vivid way. In the reform of the current teaching mode in colleges and universities, the combination of "online+offline," which combines the advantages of traditional teaching and network teaching, has become an essential direction of the development of modern teaching in the Internet environment. However, there are still a series of problems in the teaching process, teaching quality, and platform construction of online teaching in Chinese universities[1]. The development of artificial intelligence technologies such as machine learning, affective computing, intelligent agents, and their applications in the field of college education not only provide new technical means to solve problems in online teaching but also promote the further development of teaching in the personalized and accurate direction of "learner-centered." Therefore, exploring how to combine artificial intelligence technology with a college education effectively is of great significance for further promoting the development of online teaching in colleges and universities and reforming college education and teaching[2].

## 2. Connotation of AI Teaching Mode

In the past, the teaching mode of traditional colleges and universities was based on a unified talent training program in a fixed place and, at a specified time, in a fixed class. This kind of teaching mode is single and inflexible, lacks flexibility, is not conducive to the personalized training of students, and does not adapt to the characteristics of the information age and its needs for talent training[3]. Artificial intelligence teaching mode is a new teaching framework and teaching

activity mode. It combines Internet information technology with college teaching mode. Teachers use various artificial intelligence technologies and various artificial intelligence teaching resources to carry out actual teaching activities in the teaching management and teaching process. Students can download and demand artificial intelligence teaching resources anytime through online teaching platforms. For example, teachers use the curriculum platform to carry out a flipped classroom, online live classroom, and Kunhe teaching and other new models. The artificial intelligence teaching mode focuses on cultivating students' ability to apply theoretical knowledge to solve practical problems and their ability to work in teams, as well as their ability to obtain information, process information, and analyze data[4].

## 3. Intelligent Technology Has Changed the Traditional Teaching Mode

The AI teaching mode has four characteristics: first, it has the advantage of teaching quality. In the traditional teaching mode, as the disseminator of knowledge, teachers' teaching level directly affects the teaching quality[5]. As the receivers of knowledge, due to the varying group of teachers, students significantly differ in the quality of college education that students obtain. Implementing the "distance college education" project, the best teachers make courseware, and students can remotely share high-quality teaching information and excellent college education resources, improving overall teaching quality. Second, it has the advantage of teaching costs. The cost of traditional teaching information search and information transmission is high, while artificial intelligence network teaching has the function of high-speed information transmission and low information transmission cost. For example, the low-cost operation of distance college education greatly meets opportunities for more students to realize their dreams and learn[6]. Third, it has the advantage of two-way information exchange. Unlike the one-way teaching mode dominated by teachers in the traditional teaching mode, artificial intelligence teaching uses

information technology to implement interactive instruction, forming a dual primary teaching mode dominated by students and teachers. Through the online interaction function, teachers can communicate with students and conduct remote teaching and tutoring via two-way video[7].

## 4. Advantages of College Education and Teaching Are Driven By Artificial Intelligence

### 4.1. Meet the inevitable needs of the rapid development of artificial intelligence in an intelligent society

With the rapid development of big data, cloud computing, 5G, and AI, the objects involved in people's daily life can be connected to the Internet. Urban hospitals, educational institutions, parking spaces, billboards, street lamps, and other public facilities, as well as assembly lines, machine equipment, and storage facilities in factories will also complete the integrated connection; With sensors and independent IP, they will work together under the management of the artificial intelligence system, which enables the integration of all walks of life to achieve mobility and data sharing, and improves the efficiency of related

economic activities. During the "COVID-19-19" epidemic, new industries, new business forms, and new models based on intelligent technology emerged suddenly, showing strong impact resistance and developing resilience. In the post-epidemic period, the trend of digitalization, networking, and intelligence based on big data, artificial intelligence, and the Internet of Things will accelerate its evolution, redefine the global division of labor and comparative advantage, form a more substantial innovation vitality, and have a broad and profound impact on human production and lifestyle. However, the essence of intelligent development of artificial intelligence is the continuous integration and innovation of information technology, big data technology, artificial intelligence technology, and deep learning technology. This innovation must be matched by many innovative, learning, and compound talents who understand big data, artificial intelligence, the Internet of Things, and other new technologies, forming a social-ecological group of intelligent innovations of artificial intelligence. As the central position for training specialized and innovative talents, colleges and universities strive to cultivate more skills with higher quality that conform to the development trend of digital intelligence, which is a natural need to meet the rapid development of artificial intelligence in an intelligent society. As shown in Figure 1.

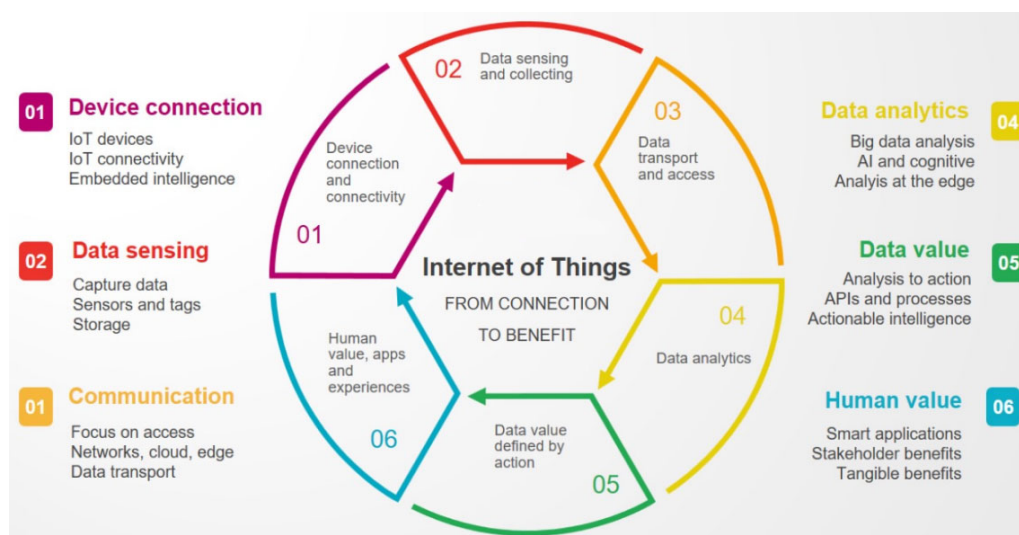


Figure 1. Advantages of College Education and Teaching Driven by Artificial Intelligence

### 4.2. Necessary needs for modernization of education, education governance system, and governance capacity

Artificial intelligence will bring about essential changes in productivity and production mode, and it is a necessary driving force for universities to realize the modernization of education, education governance system, and governance capacity. With the continued popularization of big data, artificial intelligence, 5G, AI, and other technologies by society and industry, universities have higher and higher requirements for "artificial intelligence" technology when they realize the five functions of talent training, scientific research, serving society, cultural heritage and innovation, and international cooperation and exchange. The traditional discipline and specialty system are complex to effectively guarantee the university's function and lead the development of society. More and more fragmented information can be quickly transmitted to educators and educatees only through

artificial intelligence, intelligent processing, and scientific analysis, giving play to its value in talent training, scientific research, serving society, cultural inheritance and innovation, and international cooperation and exchange. It can be seen that no matter the educator or the educatee, only if they have enough information technology capabilities of "artificial intelligence and intelligence" can they ensure that the university's functions of talent training, scientific research, and serving the society are more powerful, and can they constantly promote the modernization of education, education governance system and governance capacity.

## 5. Problems of College Education and Teaching Management in The Context of Artificial Intelligence

### 5.1. Backward concept of teaching management

Most colleges and universities have recognized the advantages and convenience of AI technology, but many teachers are more willing to adopt traditional education and teaching concepts. Because if university want to adapt to a new model, it means that teachers need to learn, analyze, try, practice, and a series of content, which undoubtedly increases the task of their education management. Therefore, teachers' subjective thoughts limit the development of AI technology to a certain extent. Even if some schools force teachers to change their traditional ideas, teachers are also in a passive state, and both the enthusiasm and efficiency of application are far from meeting the standard requirements. As shown in Figure 2.

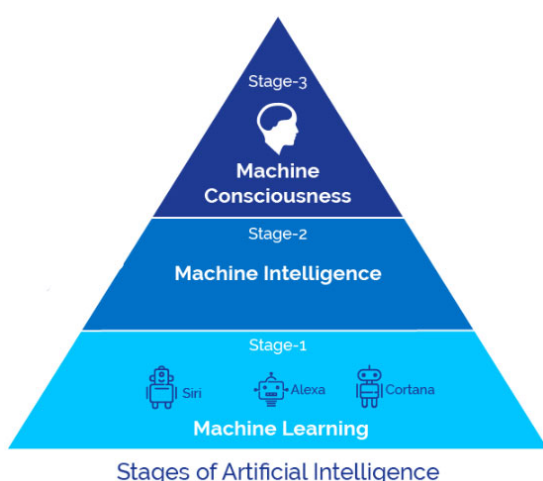


Figure 2. Connotation of artificial intelligence teaching mode

### 5.2. Outdated teaching management supporting facilities

To better adapt to the development of AI technology, schools need to work hard on software and supporting equipment to ensure that AI technology can honestly play its role. However, in the actual application process, many colleges and universities often have backward networks and supporting equipment due to their insufficient teaching resources and funds, as well as a large number of school campuses, which makes it impossible for students to regularly carry out course selection, artificial intelligence interaction, online teaching and other contents. Therefore, if schools want to make more efficient use of AI technology, they must improve the software and hardware, do an excellent job in the investment and planning of campus intelligent equipment, and actively explore new forms and methods of teaching management to improve the quality of education management.

### 5.3. Insufficient functions of teaching management information system

In the college education and teaching management system, the school uses artificial intelligence technology and big data technology to build a database and resource base and then integrates and processes various materials needed for

education and teaching to reduce manual operation and improve work efficiency. However, in the actual operation process, due to the lack of intelligence and functions of the teaching management system, it is mainly manifested in three aspects: first, most schools purchase intelligent management systems developed by third-party software companies, which makes it difficult for the teaching management system to adapt to the work needs of the school, resulting in some matters that cannot be handled with the help of the intelligent platform. Secondly, the teaching management system is a dynamic feature, and schools need to constantly improve and improve in the process of use to meet the requirements of keeping pace with the times. However, many schools do not emphasize follow-up updates after purchasing intelligent equipment and software. Finally, there is still much room for developing the functions of the smart teaching management system.

## 6. Countermeasures for the Reform of Artificial Intelligence Teaching Mode in College Education and Teaching

### 6.1. Support the artificial intelligence infrastructure construction of college education and teaching

To build a 5G+AI-based teaching environment, the so-called "If you want to do a good job, you must first use your tools". On the one hand, college education and teaching should design the overall layout of AI-based teaching management, on the other hand, it should also carry out a unified configuration of the information network technology system, provide a seamless connection guarantee for the AI-based teaching system, and respond to the needs of teaching and school management in a timely manner. The construction of a digital campus should transition from the traditional "building a virtual campus in cyberspace" to the innovative campus construction characterized by "mobile connectivity, big data analysis, intelligent perception and the Internet of Things." Finally, the data of teaching and management will be online, and the work and teaching scenarios will be upgraded to intelligent office scenarios. Through the construction of technical data and teaching middle platforms, the data can be quickly extracted and shared, and front-line teachers and school management departments can obtain the required data in a timely and accurate manner.

### 6.2. Constantly enhance the sharing and interaction of AI-based teaching resources

First, University scientific research institutions should strengthen the sharing of AI teaching resources. There are considerable differences in teaching resources, teaching environment, and teachers among major universities in China. For example, universities are divided into regular universities, 985 and 211 universities, due to different teaching levels, and universities are divided into higher education and teaching and public universities due to other investors. There is also a significant gap in teaching levels among major universities. To improve the fairness of China's higher education, the educational resources of all colleges and universities should be balanced as much as possible. The AI-based teaching resources can achieve effective sharing of teaching resources among colleges and universities. Various learning platforms

can provide rich and diverse AI-based teaching resources. Teachers of different colleges and universities can also obtain relevant curriculum design materials through the platform, which can shorten the teaching gap between colleges and universities. It is of great help to integrate resources among colleges and universities. Secondly, University should strengthen the interaction of AI teaching resources. In terms of organizational form, AI teaching should enhance the interaction between students and between students and teachers. On the one hand, students can obtain learning materials at any time through the AI platform, and during the learning process, students can also evaluate, communicate and leave messages on various teaching resources (such as audio, text, video, etc.).

### **6.3. Establish a high-quality team for the construction of AI teaching resources**

College teachers can also communicate and interact with students through the platform by analyzing and answering students' messages. In addition, through the data analysis function of the platform, teachers can also explore students' learning tracks, learning history, etc., to better understand students' learning effects, learning models, and learning content that students are interested in, to carry out more effective artificial intelligence resource construction, and finally form a virtuous circle of synthetic intelligence resource construction. The rapid development of information technology in source team construction has posed new challenges to constructing AI-based teaching resources, such as the diversification of video formats, the quick updating of coding and decoding technologies and operating systems, and the rapid upgrading of browsers. As a result, the construction of digital teaching resources must incorporate new technologies and means in the previous design and development, considering both mainstream terminal equipment and general technology and shortening the development cycle. At the same time, University should constantly update and upgrade AI teaching resources. The acquisition of knowledge is based on the dynamic basis of constantly changing problems and continuously updating information. Learning makes resources regenerate and is the redevelopment and reuse of resources. Engaged learning has more practical significance. Artificial intelligence teaching resources are not simple synthetic intelligence products. They should have the characteristics of meeting teaching needs. Artificial intelligence teaching resources should integrate multidisciplinary knowledge such as aesthetics, design, pedagogy, and computer technology. In the process of building AI teaching resources, it is an essential prerequisite to building a high-quality AI teaching resources construction team. The personnel involved in the construction of digital resources should have not only the ability to handle digital resources but also the ability to design related teaching resources. The team members should include computer professionals, film and television design talents, and teachers of related disciplines. The professional teachers are responsible for the content design of the curriculum resources, and the relevant technicians deal with the AI resources' production, editing, and specific forms of expression. Through the division of labor and cooperation among team members, they integrate the corresponding teaching design while selecting the content and finally jointly realize the construction of AI teaching resources.

### **6.4. Improve students' online learning autonomy through intelligent supervision and guidance**

University should make full use of an intelligent agent and other technologies in artificial intelligence to develop the supervision function for students' online learning, guide and urge students to learn independently, and help students cultivate their awareness of independent learning to solve the problems of students' lack of adequate supervision and weak understanding of independent learning in online teaching. For example, the application of "intelligent tutors" in online instruction based on the computer simulation of teachers can provide students with personalized learning guidance. Through tracking, recording, and analyzing students' online learning process and results, University can understand each student's interests, habits, and learning needs, to develop personalized learning programs for students, select the most appropriate online learning resources, and supervise, evaluate and feedback students' learning performance, Put forward corresponding suggestions. This is not only conducive to the supervision of the whole process of online learning but also can promote the personalized development of students to cultivate students' learning autonomy gradually and constantly improve the learning effect.

## **7. Conclusion**

The modern intelligent teaching method has its obvious advantages, but there are also many problems in the application process that need to be improved through continuous exploration in the future. The various technologies involved in AI have a natural fit with the application needs of online education. With the constant maturity and deepening of artificial intelligence technology, it can be fully used in the process of college education and teaching to inject new impetus into the development of college education reform from the aspects of enhancing interaction and feedback, satisfying personalized learning, improving teaching efficiency, and improving teaching platform.

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