

# Application of Big Data and Artificial Intelligence Technology in the Construction of Information-based Teaching Model in Colleges and Universities

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**Keywords:** Big Data and Artificial Intelligence Technology; College Information Teaching; PEST Analysis; Porter's Five Forces Model Analysis; Teaching Model;

**Abstract:** The rapid development of big data and artificial intelligence technology has penetrated into all aspects of people's lives, and the teaching mode and form of colleges and universities are also deeply affected. At present, there are some bottlenecks in the development of the mode of higher education, such as the lack of sense of classroom scene, the low function of curriculum system, the low completion rate of curriculum, the difficulty in ensuring the quality of curriculum, the increasing pressure on teachers to teach and the lack of social recognition. In view of this, this paper will use PEST analysis method and corresponding Porter's Five Forces Model to analyze the application of big data and artificial intelligence technology in university information teaching mode based on the current technology hotspot - big data and artificial intelligence technology, so as to provide power and reference for the upgrading of traditional classroom and the development of information technology.

## 1. Introduction

The rapid development of big data and artificial intelligence technology has led human society into the era of intelligence and data, and its rapid iterative development has affected many aspects of human society, such as education, medical treatment, transportation, etc. [1-3]. In the information-based teaching mode of higher education, big data and artificial intelligence technology have attracted worldwide attention. At the same time, artificial intelligence and big data technology also provide a large number of possibilities and development opportunities for the development of higher education informatization [4-6]. Traditional classroom education is devoted to the education of existing knowledge and is aimed at cultivating intellectuals and skilled people. However, in today's new education system, the traditional classroom has been unable to meet the needs of society. It is very important and meaningful to deepen the reform and innovation of education research industry based on big data and artificial intelligence technology, and to realize the integration of technology and education.

In view of the application of big data and artificial intelligence technology in university information education, a large number of scholars and research institutions have analyzed and studied it. American scholar [8] first proposed that the essence and core of educational AI is to promote the rapid development of applicable learning environment and AI educational tools. Its main purpose is to use AI to open the black box of learning and understand how learning takes place. British scholar [9] pointed out that educational AI is the most important part. It is to optimize the computer and teaching platform to achieve its integration, so that teachers can teach more efficiently and students can participate in learning better. In the educational practice level of artificial intelligence and big data technology, American scholars [10] once developed an online learning software focusing on mathematics disciplines in Colleges and universities. A self-developed educational robot is used as a learning partner of students, so as to explore its influence on students' learning in the process of students' learning. Google, Apple and other companies [11-15] use intelligent voice assistant to apply it in College teaching, so as to realize voice-driven artificial intelligence teaching.

In order to better analyze and study the role of big data and artificial intelligence technology in the construction of information-based teaching model in Colleges and universities, at the same time,

it provides new reference and model for artificial intelligence teaching, and promotes the better development of information-based education in Colleges and universities. At the same time, in order to solve the problems existing in the current university education model, such as the lack of classroom scene, the low function of the curriculum system, the low completion rate of the curriculum, the difficulty in ensuring the quality of the curriculum, the increasing pressure on teachers to teach, the lack of social recognition and so on. In view of this, this paper will use PEST analysis method and corresponding Porter's Five Forces Model to analyze the application of big data and artificial intelligence technology in university information teaching mode based on the current technology hotspot - big data and artificial intelligence technology, so as to provide power and reference for the upgrading of traditional classroom and the development of information technology.

The article is arranged as follows:

The second section of this paper will focus on the analysis of the current situation of information-based teaching in Colleges and universities and the existing problems of information-based teaching in Colleges and universities.

The third section of this paper will focus on the analysis of the application of AI and big data technology in the construction of information-based teaching in Colleges and universities, and give corresponding application cases.

Finally, this paper will make a summary and outlook.

## 2. Present Situation and Existing Problems of Information-based Teaching in Colleges and Universities

Information-based teaching in Colleges and universities is the product of the development of human social science and technology, but there are still uneven situations in the construction of information-based teaching in the world. The United States has been at the forefront of information-based teaching all over the world. In the process of promoting information-based teaching in traditional classroom, it also vigorously promotes network-based teaching. Its main idea of MOOC online education makes its corresponding three education platforms develop rapidly. At the same time, the corresponding universities in the United States have launched their own online education. Educational platform, but even in the United States where information technology teaching is so developed, there are problems such as uneven curriculum quality, low completion rate and serious regionalization. The popularization of information-based teaching in China is relatively late. At present, the mainstream technology of information-based teaching stays in multimedia technology and online teaching. The corresponding teaching based on big data and artificial intelligence technology is relatively few. As shown in Figure 1, the statistical subdivision of information-based teaching means in Chinese universities can be seen from the figure. Information-based teaching methods are relatively poor, while the application of AI and big data technology is relatively small.

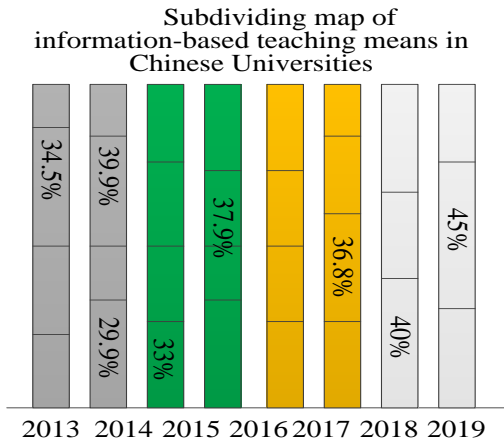


Figure 1. Subdividing map of information-based teaching means in Chinese Universities

With the rapid development of information technology and artificial intelligence technology, information-based teaching methods in Colleges and Universities Based on big data and artificial intelligence technology have become the current situation of higher education in various countries. The application form of mainstream AI and big data technology in university teaching system is shown in Figure 2.

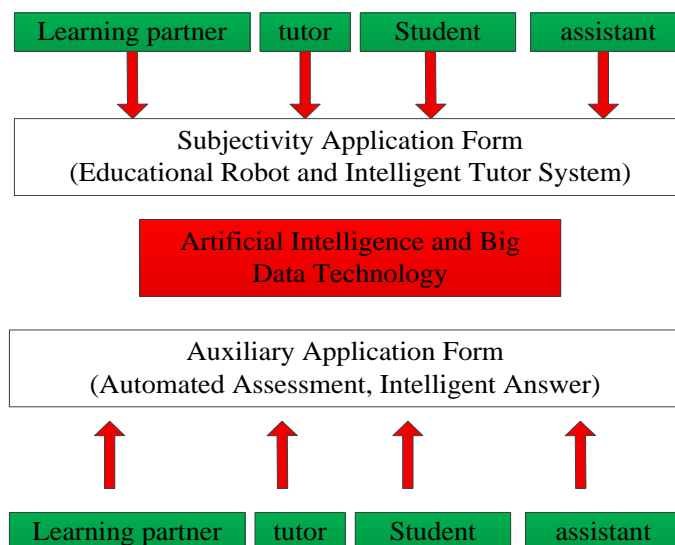


Figure 2. Application of artificial intelligence and big data technology in teaching system

Based on the application form of Figure 2 above and the current mainstream literature, we can see the problems existing in the current information-based education in Colleges and universities as follows:

1) Lack of classroom experience

The sense of classroom scene is the biggest problem in the current information-based education in Colleges and universities. The current information-based teaching essentially copies part of the content of the current traditional classroom. At the same time, the current information-based teaching pays too much attention to the standardization, batch and low-cost of the education model, which makes it difficult to realize the individualized needs of learning.

2) Information system needs to be upgraded

At present, the equipment related to the information classroom is still in the multimedia era. With the rapid development of information technology and artificial intelligence technology, it is necessary to upgrade the information classroom in Colleges and universities in an all-round way.

3) Lack of effective curriculum certification system

In this respect, the main reason is that the information-based curriculum has not been standardized, and different institutions and schools rely on the information-based classroom when the corresponding texts are incomplete. Therefore, it is necessary to call for the establishment of the corresponding certification system of education courses, and then achieve standardized teaching.

### 3. The Application of Artificial Intelligence and Big Data Technology in the Construction of Information-based Teaching in Colleges and Universities

In order to better realize the application of AI and big data technology in the construction of information-based teaching in Colleges and universities, this section will first analyze the impact of AI and big data technology on the design of teaching system based on this. Figure 3 shows the image of AI and big data technology in the design of teaching system. From the picture, we can see that the related influence mainly concentrates on seven elements of teaching design: students, teachers, objectives, courses, methods, environment and feedback. From the figure, we can see that AI and big data technology have changed the teaching objectives and teaching subjects and objects of informationization teaching in Colleges and universities most obviously, and new courses related to AI have been added at the level of teaching content. At the same time, efficient classroom has

changed from paying attention to students' knowledge acceptance ability to paying attention to students' man-machine cooperation.

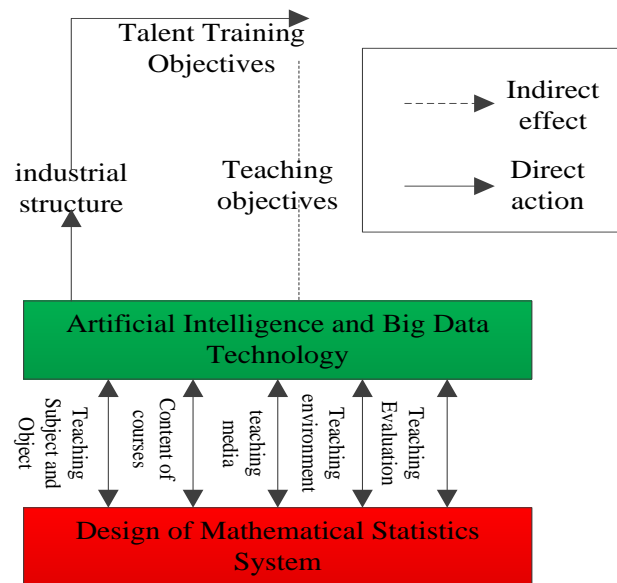


Figure 3. The influence of AI and big data technology on information-based teaching in colleges and universities

Based on the above influence, this paper gives the application of artificial intelligence and big data technology in the construction of information-based teaching in Colleges and universities, mainly from three aspects to give substantive suggestions:

#### 1) Setting up Information-based Teaching Objectives

Under the background of artificial intelligence and big data technology, information-based teaching in Colleges and universities needs to pay attention to the in-depth reform of teaching objectives. It is necessary to re-examine the differences between human intelligence and artificial intelligence in the construction of information-based classroom, return to the essence of human, reflect the special advantages of human beings and the special status of existence, so as to put forward new talent training objectives, and indirectly change the teaching objectives.

#### 2) The Change of Teaching Subject

In the application of artificial intelligence and big data technology in the reform of information-based teaching in Colleges and universities, it is necessary to further clarify the change of teaching subject and object. Under the technology of artificial intelligence and big data, the traditional form of subject and object in university teaching is no longer applicable. The corresponding transformation of subject and object is shown in Figure 4 below. These three kinds of subject and object factors should be fully considered in the actual construction of University informatization.

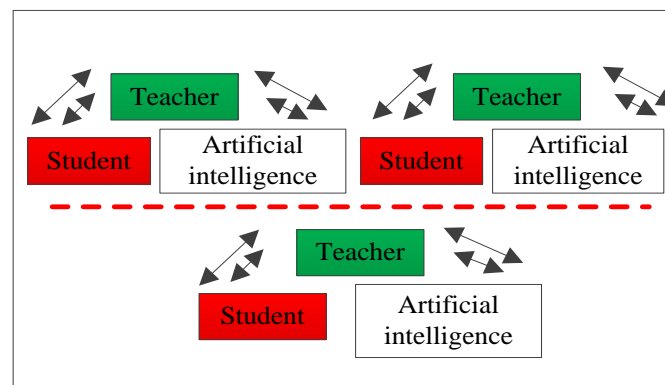


Figure 4. The subject-object existence form of college informatization teaching under artificial intelligence and big data technology

### 3) The Change of Teaching Content

Under the background of artificial intelligence and big data, the reform of teaching content in the construction of university informatization needs to be fully considered. The main changes in teaching content should be reflected in the following aspects: the need to add courses related to artificial intelligence, the need to pay attention to the ability of man-machine collaboration, and the need to pay attention to the learning content of Humanities knowledge. Of course, the change of teaching content will cause the influence of teaching media. Under the background of artificial intelligence, the corresponding teaching media has evolved into educational robots and intelligent teaching systems. The comparison Table between them and traditional teaching modes is shown in Table 1.

Table 1: The Impact of Artificial Intelligence and Big Data Technology on the Current Information-based Teaching in Colleges and Universities

technology	teaching media	Teaching Form
Printing Technology	Textbooks, blackboards, chalk	Traditional Teaching
Media Technology	Slide, TV, Film	Audiovisual Teaching
Computer Communication Technology	Computer, Internet	Digital Teaching
artificial intelligence technology	Intelligent Teaching System and Educational Robot	Intelligent Teaching

In the case of the application of AI and big data technology in the classroom of university informatization construction, the mainstream cases are mainly American-style flip classroom, online in-depth learning classroom, corresponding AI Learning Assistant “learning overlord” and a series of related intelligent learning platforms.

## 5. Conclusion

The rapid development of AI and big data technology has deeply affected all aspects of people's lives, and the education industry in Colleges and universities inevitably develops with it. In order to solve the problems existing in the current college education model, such as the lack of classroom scene, the low function of curriculum system, the low completion rate of curriculum, the difficulty of ensuring the quality of curriculum, the increasing pressure on teachers to teach, the lack of social recognition and so on. In view of this, based on the current technology hotspot - big data and artificial intelligence technology, this paper uses PEST analysis method and the corresponding Porter's Five Forces model to analyze the application of big data and artificial intelligence technology in the information-based teaching mode of colleges and universities, thus providing power and reference for the upgrading of traditional classroom and the development of information technology.

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