

# Research on Applications of Artificial Intelligence in Education

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**To cite this article:**

Zheng Rui, Tuyatsetseg Badarch. Research on Applications of Artificial Intelligence in Education. *American Journal of Computer Science and Technology*. Special Issue: *Advances in Computer Science and Future Technology*. Vol. 5, No. 2, 2022, pp. 72-79.

doi: 10.11648/j.ajcst.20220502.17

**Received:** March 28, 2022; **Accepted:** April 15, 2022; **Published:** May 24, 2022

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**Abstract:** With the rapid development of Information Technology (IT) in China, the IT sector is well recognized as a wealth of opportunities for businesses and societies in the country. At the same time, China education system is also aware of the auxiliary value of IT. In this article, we have studied how artificial intelligence is used in education. This paper presents the possibility of the development of artificial intelligence technology has been reflected in many methodologies in education. Based on the study, we focus on the the importance of artificial intelligence usages in education. The study also looked at what types of artificial intelligence technologies are widely used in education sector. Within this area, the research presents the importance of artificial intelligence, technologies, and how teachers and students use them in their teaching and learning process. The paper result shows students can get out of the passive learning state by using artificial intelligence technology, and gradually transform from solving exercises to solving problems. In general, we design an information-based teaching model to display knowledge more intuitively in front of students, which not only enriches the overall teaching but also reduces the difficulty of students' learning. This article analyzes many aspects about the application of artificial intelligence in college teaching and learning. In this way, we aim to show that artificial intelligence is an essential tool in education. We show the research results about the use of artificial intelligence in the way we teach and learn, which we currently use, provides a great opportunity for further independent learning.

**Keywords:** Artificial Intelligence, Virtual Reality, Teaching, Simulation

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## 1. Introduction

This article analyzes the actual concept of artificial intelligence, in teaching from the perspective of student's learning, teacher's teaching, administrative work, and parent's multi-angle family education [1]. According the emphasizing some studies of AI in education, there are prominent AI technologies and tools [2-4], as well as software applications such as personal tutors, intelligent support for collaborative learning, and intelligent virtual reality [5], student failing prediction algorithm [6]. This article focuses on the analysis for applications of artificial intelligence technology to bring more substantial help to the development of education and teaching activities in today's

colleges and universities.

## 2. Background Analysis of Artificial Intelligence in Education

Artificial intelligence (AI) in education have received a lot of attention in the last couple of years. In studies, out of 2656 initially identified publications for the period between 2007 and 2018, 146 articles were included for final synthesis, according to explicit inclusion and exclusion criteria [7]. According the study, there are four areas of AI applications including profiling and prediction, assessment and evaluation, adaptive systems, personalization, and intelligent tutoring systems in education in academic support services, and

institutional and administrative services [7-8].

In the process of carrying out education and teaching activities, using artificial intelligence to enhance the overall teaching quality and cultivate students' multi-dimensional literacy can better meet the basic requirements of modern education, and colleges and universities are looking forward to using the advantages of artificial intelligence to solve the shortcomings in previous teaching [9].

Artificial intelligence is operated by a series of information technologies such as the Internet and big data.

In general, artificial intelligence technology studies human intelligence, behavioral laws, and behavioral patterns. Based on artificial intelligence information processing theory, a computing system that can be similar to human intelligent behavior is designed. In the development of artificial intelligence technology in China, the main research is on the compilation and calculation system to achieve the imitation of human intelligence, so as to build an intelligent mode of machine operation.

There are two main levels in artificial intelligence. One is theoretical approach, and the other is practical approach. The theoretical approach of artificial intelligence is to lay a foundation for the understanding of theoretical research for

engineering research.

The engineering research of artificial intelligence mainly focuses on the product development and design of some artificial intelligence equipment and systems. Whether it is engineering research or theoretical research, the two are closely related and do not exist in an independent form. Artificial intelligence theoretical research and engineering research are committed to solve many problems such as processing with intelligent symbols, intelligent information storage and internal processing, information input and output, comparison of assignments, and symbolic processing.

### 3. The Applications and Significance of Artificial Intelligence in Education

In recent studies present that private companies such as Google, which acquired European AI start-up Deep Mind, and non-profit public-private partnerships such as the German Research Centre for Artificial Intelligence Footnote1 (DFKI) invested a huge amount of money, it shows there will soon have a significant impact on higher education institutions [8].

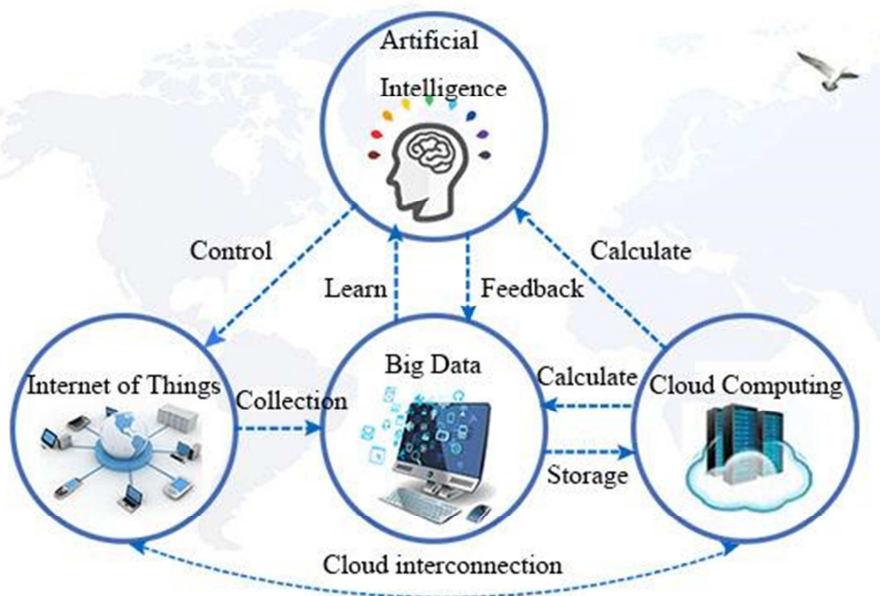


Figure 1. AI system mind map.

Based on the background of internet information technology, the use of artificial intelligence assisted teaching can ensure that teaching is more personalized. Smart education is also conducive to meeting the development needs of students, teachers, parents, and even the entire education field, and it has a great impact on improving the overall quality of education great help [10].

#### 3.1. On Trends of AI Penetration in Education

Meanwhile in education and teaching, it is also very important to cultivate students' personal abilities, and

learning interest, by substituting artificial intelligence and giving full play to the advantages of artificial intelligence. Therefore, we have been expecting artificial intelligence technology to be more mature and stably applied in educational activities. At this stage, although artificial intelligence cannot completely replace teachers, nor can it be used as the main teaching method. Under the premise of reasonable application, teachers can integrate artificial intelligence with teaching activities. Applying rhythm to change the traditional teaching mode can also inject fresh blood into teaching and bring substantial help to the creation

of efficient teaching classrooms [11].

In the process of continuous innovation and reform of China higher education system, artificial intelligence has not only played a great role in teaching but also has a very valuable auxiliary advantage for scientific research and administrative management. In the education system, educational resources have formed a large number of data based prototypes, and through the rational use of artificial intelligence technology to build big data models, to achieve a reasonable integration of educational resources. A large number of data models also help the data collection of various business informatization platforms, such as unified data management of teaching systems, educational administration systems, and student management systems, which can facilitate teachers and students to refer to such data.

It can promote the development of the overall teaching work in the teaching activities of colleges and universities, the experimental training teaching module is inseparable, and by reasonably substituting artificial intelligence, a high-quality training system can be built. Each training session will be guided and analyzed, which can accurately capture the shortcomings of students in the actual operational process, and carry out short-board training for students in a targeted manner.

Artificial intelligence can promote students to experience the interest of the subject so that it is more conducive to cultivating students' interest in learning and reducing students' learning costs. Students can also use artificial intelligence to complete learning activities in the process of self-learning in schools, without completely relying on teachers' guidance and breaking away from the previous passive learning mode, improving students' autonomous learning ability. It also reduces the workload of teachers.

### **3.2. On the Significance of AI Penetration in Education**

From the teaching point of view, the application of artificial intelligence in education can promote the rational and effective integration of psychological knowledge, educational knowledge and social knowledge into the lesson. Teachers use artificial intelligence to display and capture such information. Moreover, in future education, artificial intelligence will also become an important support for students and teachers to complete the entire learning activity, ensuring the diversification of education.

In addition, artificial intelligence can help teachers understand the direction that students are suitable for in the future, so as to effectively guide and educate students. Based on this, students will receive a more targeted education, which further highlights the individualization of education.

Besides, artificial intelligence effectively connects formal learning and informal learning, making education more open and individualized, which does not require teachers to spend too much energy in this regard. In addition, students' learning and teachers' teaching not only take place in the classroom, but also in daily life, education will become more open, and the important sources of knowledge acquired by students are

not only schools and teachers, but also artificial intelligence. Through the assistance of teachers, they can gain knowledge and form skills, and maintain a lifelong learning system, which can also further improve the teaching efficiency of teachers.

In the past, we defined the teaching profession as "teaching and educating people", but with the advent of the era of artificial intelligence, the main task of teachers in the teaching process is not only to impart knowledge, but to assist students and guide them to grow well. The above goals can be achieved through artificial intelligence, which shows how much convenience artificial intelligence has brought to education today.

## **4. Technical Analysis of Artificial Intelligence in Education**

### **4.1. Intelligent Identification Technology**

Intelligent recognition technology is the most basic category in artificial intelligence technology. Intelligent recognition technology is mainly divided into two parts: one is image recognition technology, and the other is speech recognition technology. In the education system of colleges and universities, the application of image recognition technology is broadly used [12]. For example, in the learning process, if students encounter a problem that is difficult to solve, they can use a smartphone to shoot the problem, convert the problem into a picture and upload it to the learning platform. At this time, the intelligent recognition module in the learning platform will combine with the students. The uploaded pictures are read, identified and processed. After the processing is completed, retrieval and analysis are carried out, and finally sent to the students. Such a process can help students solve problems easily and master effective methods to solve problems, which further enhances students' learning efficiency.

With the continuous development of image recognition technology, we begin to a high degree of recognition for some handwritten texts rather than just being able to recognize printed texts. Artificial intelligence can also use its image recognition technology to identify the information we want to express.

At the same time, image recognition technology can also mark students' homework and examination papers, which undoubtedly brings a lot of support to teachers' work.

Image recognition technology also includes face recognition technology. Face recognition technology has a wide range of applications in the college education system. For example, students check in with their faces to avoid situations such as exams and check-ins; or in dormitories. Students in front of the building can sign in with their faces, which can prevent some off-campus personnel or people unrelated to the students from entering and leaving the student dormitory at will.

In addition, face recognition technology can also accurately identify the micro expressions on students' faces,

analyze students' psychological changes. Based on this, it can effectively capture students' different psychological problems in different learning links.

In addition to image recognition technology, speech recognition technology has gradually matured in recent years, and has been widely used in college education systems. For example, teachers and students can reasonably use the intelligent teaching platform to carry out human computer interaction, and speech recognition technology can assist students and teachers to convert the speeches of students and teachers into text, which further improves the efficiency of human-computer interaction. For example, teachers can use speech recognition technology to save time when teaching, and convert their oral content into text and organize them into blackboard writing for students to watch and memorize [13]. In addition, intelligent speech recognition technology can also conduct self-assessment on some language courses, which can effectively reduce the workload of teachers, and avoid teachers' subjective factors when evaluating language courses, thus form a scientific evaluation system.

#### **4.2. Learning Analysis Technology**

In the university education system, another application category of artificial intelligence technology is learning analysis technology.

Learning analysis technology is based on big data technology to perform analysis skills. The university teaching platform can upload data related to students' learning behavior to the data center. Next, the data center will use big data technology to track and compare to form student portraits. Next, teachers analyze their learning laws and characteristics based on the portraits of students in the class, and make corresponding adjustments to the teaching models.

In addition, the use of learning analysis technology can reasonably evaluate students' academic performance, and process the abstract learning process of students into visual data. After receiving these data, teachers can also use this as a basis for the next class. Students can also use such data as a reference to analyze problems in their own learning process, change their learning methods, and reasonably adjust their time.

Moreover, the learning analysis technology based on big data can more accurately judge the learning characteristics of students, and filter out the knowledge content with a high degree of matching according to the learning characteristics of the students, and transmit this content to the students. Students will naturally be able to master more lessons within time, reduce students' pressure and enhance teaching efficiency. Therefore, we can also understand that learning analysis technology has become a very important technology category in artificial intelligence technology, and it occupies an irreplaceable position in the development of China education at this stage.

#### **4.3. Virtual Reality Technology**

In teaching activities, the application of artificial

intelligence technology has solved many substantive problems, and at the same time, the existing virtual reality technology has further provided teaching assistance in the process of rapid development [14]. It can be said that virtual reality technology has made a very valuable innovation to students' learning methods and ideas. This technology can promote students to mobilize their own senses to carry out learning activities, and bring students a wonderful and immersive learning experience, which encourages students to learn to maintain focus, actively participate in learning activities, and gradually form a strong understanding and interest in learning.

In the college education system, combined with different situations, the functions of virtual reality technology can be divided into virtual roaming, virtual campus and virtual experiment. For example, before the official start of teaching, teachers can configure the needs of the teaching of this course from the three-dimensional database. Students will have an immersive experience and obtain a learning effect that is completely different from the traditional learning mode in the virtual environment. In addition, teachers can choose some other special equipment, such as data gloves, 3D displays, etc. Virtual reality technology, can build a more ideal virtual reality environment and promote students to have a better learning experience.

## **5. The Application of Artificial Intelligence in College Teaching**

In the educational activities of colleges and universities, artificial intelligence technology has been widely used as an advanced and effective method. With the assistance of artificial intelligence, the overall education and teaching effect has undergone significant changes [15]. The effective combination of artificial intelligence and education and teaching also brings many possibilities for the reform of traditional education and teaching, which is closely related to the active implementation of education reform in colleges and universities. Author analyzes the application of artificial intelligence for different objects and different scenarios.

### **5.1. Application of AI in Security Assistance Management**

Today, among many network cyber defense technologies in China, firewall technology is a relatively common defense technology. However, this method is also divided into many types, and only a few methods can play a role in practical applications [18]. If AI technology and firewall technology can be effectively integrated, the problems and deficiencies of firewall application technology can be better solved [19]. Therefore, relevant safety management should use intelligent methods to analyze data and information, and then should make relevant decisions. In this way, the security access situation of data information can be set, and it can be protected in many aspects, then it can protect the network from the invasion of viruses [20]. Therefore, in order to ensure the level and effectiveness of network cyber defense,

it is necessary to make full use of advanced intelligent firewall technology to protect users' relevant information, prevent hackers from stealing users' important information, and prevent information leakage.

### **5.2. Application of AI in Classroom Discipline Management**

In the process of college education and teaching, it is particularly critical to ensure the effectiveness of classroom discipline, and for the vast majority of college teachers, this is also a problem that they should focus on in teaching. The formation of various aspects of consciousness of students at the university level tends to be sound, and they have their own cognitions about some things. Teachers can no longer require students to maintain a good learning state and classroom discipline as they do with lower grade students, but should take autonomy. It is completely handed over to students and guides students to use classroom time reasonably to complete learning activities [16]. If the teacher guides the students in the way of language teaching or rules, it is very easy to cause the students to resist, and it will increase the teaching pressure of the teacher and affect the whole teaching work. Therefore, teachers can reasonably use artificial intelligence to manage classroom discipline, and solve some problems existing in the process of classroom discipline management by giving full play to the actual characteristics of artificial intelligence and using its advantages. The application of artificial intelligence can be from the following two aspects.

According to the situation, we can install surveillance cameras in the classroom, and connect surveillance cameras and multimedia teaching together. Through such a setting, the management effect can be achieved with half the effort. In addition, at the other end of the monitoring, virtual software is used to quickly capture the inappropriate learning behavior of students in the monitoring middle school, and record them in the form of photos and videos for teachers to give feedback to students after class.

On the one hand, in classroom teaching, students' learning performance and learning status will be supervised in an all-round way, so that students can consciously correct some of their wrong behaviors and performances, and then actively carry out learning activities. In the process, students also influence each other.

To further ensure the overall classroom environment; the use of cameras for monitoring can record the performance of students during the entire learning process, and teachers upload them to a special database to organize, save, and compress the data into learning packages. Students can not only observe their own state in the learning process through the data package, but also review the knowledge explained by teachers in class, and can also have a real understanding of the problems existing during their own learning, which is conducive to guiding students to correct themselves independently. Teachers can use artificial intelligence to evaluate students' classroom discipline.

By adopting such an evaluation method, the burden of teachers' management can be effectively reduced, and the

evaluation results can be prevented from being affected by teachers' bias. At the same time, in order to further ensure the effectiveness of classroom discipline management, teachers can assess students' classroom performance based on the data and information fed back by artificial intelligence, and incorporate it into the scope of credit evaluation so that students can independently follow classroom discipline and create a good classroom learning atmosphere [17].

### **5.3. Application in Expanding Teaching Resources**

Teachers should also provide students with more diversified teaching content, so that students can acquire more knowledge and gradually form a higher learning level. The expansion of teaching resources can help students build a complete knowledge system, which can be studied from the following two aspects.

Firstly, combine multimedia equipment to collect more effective learning resources for students. Consider the actual characteristics of students in various majors and professional curriculum settings to create a very interesting learning atmosphere, and help students get in touch with other knowledge points related to professional knowledge. For different professional courses, teachers also need to rationally and scientifically integrate the content of teaching materials and multimedia courseware, teachers ought to use multimedia equipment to teach lesson points that are difficult to understand instead of using it for every lesson [18]. When making courseware for multimedia equipment, teachers can design the teaching content in various forms such as pictures, videos, music, and comics, and appropriately integrate some relevant points while designing the teaching content. This is more in line with the learning needs of students.

Secondly, teachers can also extend artificial intelligence technology to students' after school time. A practical self-media platform carries out after school learning activities to extend knowledge and collect more relevant information according to the knowledge learned in class, which can not only broaden the channels for students to obtain information and learning resources.

### **5.4. Application of AI in Teaching Management System**

According to the observation of colleges and universities in China at this stage, it is found that many colleges and universities have established intelligent teaching management systems based on artificial intelligence technology. In this teaching management system, teaching and learning both have become more convenient. It can improve the overall quality of education [19]. Therefore, colleges and universities should continuously innovate their application in the teaching management system based on the characteristics of artificial intelligence technology.

First of all, artificial intelligence should be used to ensure that the constructed management system includes the modules including student cognitive ability module, student learning interest module, student learning style module, and student personalized cognitive learning module.

Secondly, a corresponding teaching evaluation algorithm system should be constructed by artificial intelligence, which includes a test question bank module, a test question module, and a maintenance management and evaluation module.

Finally, a teaching management goals should be extended by artificial intelligence to build a corresponding main structure of the overall system design, an experiment test analysis, subsystem design.

## 6. The Application of Artificial Intelligence in College Learning

### 6.1. Enhance Students' Understanding of Learning with Artificial Intelligence

Artificial intelligence technology has a certain cost. If this technology is only used to improve the efficiency of training, then the actual value of artificial intelligence technology will be wasted, and the cost is not worth it. Therefore, artificial intelligence technology must be applied in reasonable fields. In the process of education development, artificial intelligence should find its real use direction and give full play to its practical characteristics to assist the progress and completion of education work. From the perspective of students, artificial intelligence can effectively assist students' learning [20]. For example, under the guidance of teachers and students' self-exploration, students can get out of the passive learning state by using artificial intelligence technology, and gradually transform from solving exercises to solving problems. In addition, many students think that learning is a passive thing, and they will take the initiative to complete learning activities under the guidance of teachers. At this time, students can be encouraged to carry out individualized learning by using artificial intelligence to help students understand.

### 6.2. Using Artificial Intelligence to Reduce Students' Learning Burden

Students at the university stage need to make continuous efforts for their future life development direction. Therefore, learning is the most important thing in their daily life [21]. However, because an instructor may be responsible for multiple students, many times students cannot get targeted guidance. At this time, coupled with some problems in students' life, it will bring a very heavy learning burden.

Therefore, artificial intelligence can be used to reduce the learning burden of students. For example, when students encounter difficult problems in the learning process, they can use artificial intelligence technology to collect solutions to problems, and artificial intelligence can give students detailed information. At the same time, students can also use artificial intelligence to check the homework or experimental homework assigned by teachers. It is more practical, and it is more helpful to students' learning. Students understand their own shortcomings through artificial intelligence technology,

and they will seriously reflect on the problems to find the right way to study. direction.

### 6.3. Application of AI in Daily Life Management

In the education system of colleges and universities, managers have a very important position, and the quality of teaching management will directly affect the overall quality of students' study and life [22]. Therefore, artificial intelligence can be reasonably used to carry out student management work, assist administrators in their daily work activities, and ensure the overall management efficiency. In the process of managing students with artificial intelligence, it can be applied to the basic management stage of freshmen registration. For example, when freshmen register, teaching administrators can use artificial intelligence to count and sort out students' ethnicity, gender, region, and majors, so as to reasonably divide dormitories for students, and combine students' professional information to set up the semester's class schedule. At the same time, artificial intelligence can also efficiently manage students' room and board, food problems. For example, based on artificial intelligence technology, a card is designed for students. Students holding a card can eat in the cafeteria or borrow books from the library. It is more convenient for students to carry out management work because of their own ID cards in the school.

### 6.4. Application of AI in Learning Management

It is very important to reasonably manage students' learning management with the help of artificial intelligence technology. For example, in many colleges and universities, in order to enhance students' some school-enterprise cooperation will be designed for students to learn and practice. In the process, how to accurately collect student information, register students' problems during practice, and other related data have become important issues. This requires teaching administrators to carefully register to avoid any data omission, which is also convenient. It means that at this time, the teaching management personnel will face the important problems of great workload and time crunch. Therefore, in order to ensure the effectiveness of the work of managers and ensure that the data is sorted and used in a timely manner, managers can use artificial intelligence to complete practical work [23]. For example, the intelligent platform built on the basis of artificial intelligence technology reads the student's ID card data, so that the student's ID card information and the photo on the ID card can be quickly read and stored in the system for use. Next, enter the relevant information of students' projects, practical process, practical problems, practical evaluation, etc., The practical learning of students can be cataloged to the database which can make it convenient for teachers down the road.

### 6.5. The Auxiliary Application of Artificial Intelligence to Parents

For parents, it is very important for them to be able to see

the grades and daily performance of students in school in a timely manner, which will also be one of the important manifestations of establishing a good connection between the school and parents. Students at the university stage are about to face many problems such as graduation and employment. At this time, students' mental health problems, learning situation, and career planning problems are the common concerns of teachers and parents [24]. However, because some students come to school from other places to study, they naturally have a certain distance from their parents. If parents want to know the specific situation of the students, they have to communicate with the instructor or the students themselves, which naturally takes a certain amount of time. By using artificial intelligence, such a complicated and inefficient information collection process can be solved. For example, school-related technical personnel can use information technology as a support to build an efficient platform for schools and parents to interact. In addition, schools can use artificial intelligence technology to build a system, show the education system to parents transparently and openly [25]. At the same time, from the perspective of students, schools can use the information interaction platform based on artificial intelligence technology to publish corresponding career planning information, and encourage parents to make correct career planning guidance during students' summer and winter vacations.

## 7. Conclusion

To sum up, we have concentrated on how artificial intelligence is used in education. The research includes the importance of artificial intelligence, technologies, and how teachers and students use them in their teaching and learning process. For example, under the guidance of teachers and students' self-exploration, students can get out of the passive learning state by using artificial intelligence technology, and gradually transform from solving exercises to solving problems. The use of artificial intelligence in the way we teach and learn, which we currently use, provides a great opportunity for further independent learning. This paper shows the possibility of the development of artificial intelligence technology has been reflected in many methodologies in education. In the field of education, more attention should be paid to the value of artificial intelligence. The study can give us a hint an artificial intelligence can combine with multiple modules in the education system.

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