

The Influence of AI on Distance Education and Its Application in the New Situation

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Abstract: In recent years, all kinds of modern network information technology have developed very rapidly. Affected by this, artificial intelligence technology has been rapidly developed and started to be promoted and applied, which has brought strong impetus to the further development of various fields in society. As an important educational model in the new era, distance education can play an important role in improving the freedom of education, realizing the efficient use of educational resources and promoting the continuous improvement of national quality. By organically combining AI technology with distance education, the role of distance education can be brought into full play. For this reason, the article first gives a brief introduction to AI and distance education, and at the same time carries out an in-depth analysis of the impact of AI on distance education. Based on this, the article discusses the specific application of AI in distance education from the aspects of intelligent robot, learning guidance system and virtual simulation, in order to promote the continuous development of distance education.

1. Introduction

With the continuous development of cloud computing, the Internet, big data and other technical means, artificial intelligence with deep learning as its main core has gradually emerged and developed rapidly. At this stage, it has gradually penetrated into all aspects of people's production and life, such as natural language processing, automatic driving, voice recognition and smart home, etc. [1]. In this context, for distance education, in its future development process, it is bound to have more and more extensive use of artificial intelligence technology, so as to continuously improve the effectiveness of distance education and promote the continuous improvement of national comprehensive quality. Therefore, it is necessary to make in-depth research on the impact of AI on distance education and its specific application under the new situation, so as to ensure that AI can fully play its due value and role in the field of distance education, and thus promote the healthy and long-term development of distance education activities in China. We use the methods of literature research and logical analysis to objectively analyze the impact of AI on distance education under the new situation and the specific application of AI in distance education activities, indicating that AI has a broad application market and development prospects in the field of education. This is not

only a good inspiration for educators, but also a good inspiration for researchers of artificial intelligence technology. We have reason to believe that in the near future, AI will profoundly change the face of education, promote educational innovation, and be accepted and welcomed by educators.

2. AI Interpretation

As for artificial intelligence, it mainly refers to a kind of technical science that specializes in researching and developing a series of theories, methods and technologies used to simulate, extend and expand human intelligence. It can be regarded as an important branch of computer science, which aims to fully understand and grasp the essence of intelligence, then create a new intelligent machine that can effectively make a series of responses in a way similar to human intelligence [2]. At present, the research in this field involves robots, language recognition, image recognition and natural language processing, which provides a strong impetus for the development of social economy.

2.1. Basic Features

At present, AI has the following basic characteristics.

2.1.1. Permeability

As AI itself belongs to an advanced digital technology with strong intelligence, versatility and foundation, it has the potential to fully integrate with all sectors of society and every link of production and life. The feature that this universal technology can be widely applied to every field of real society is currently defined as "permeability" [3]. For AI, it has this feature. At the early stage of development, such technology can only be used in some simple scenarios or to solve some abstract conceptual problems. At this stage, in the context of the continuous development of technology, it is gradually applied to more diversified and comprehensive scenarios, and more in-depth. This permeability is also enough to prove that AI itself has the ability or potential to have a broad and even global impact on the development of economic society.

2.1.2. Synergy

By integrating artificial intelligence into the production field, it can enhance the adaptability of various factors such as capital, labor and technology to each other, so that a series of production links such as technology research and development, engineering realization and technology application feedback can obtain better synergy, and help to improve the overall operating efficiency. Integrating artificial intelligence into the consumption field can intelligently portray the user's consumption habits and consumption needs, so as to realize the automatic matching between personalized demand and targeted supply, thus continuously releasing the consumption potential. So at present, the collaborative characteristics of AI itself can be mainly reflected in its continuous improvement of social and economic operation efficiency [4].

2.1.3. Substitutability

This is one of the most obvious features of AI, which means that it can directly replace the labor factors. Whether it is simple or complex production activities, artificial intelligence will continue to play a very strong role in substitution at present and in the future, which will also promote its supporting role in economic and social development.

2.2. Current Situation of AI Development in China

AI is an important force to promote the continuous development and upgrading of the digital economy. In recent years, influenced and promoted by various factors such as national policies, China's AI field has shown a rapid development trend, as detailed below.

2.2.1. From the Perspective of Industrial Conditions

From the perspective of the industrial chain, the AI industry can be divided into three aspects: the basic layer, the technical layer and the application layer. According to the relevant data provided by the Ministry of Industry and Information Technology, by the end of 2022, the scale of China's core industry in the field of artificial intelligence has reached 508 billion yuan, an increase of about 18% compared with 2021. A total of 8586 major enterprises have been accumulated, and about 5985 enterprises have actually survived, of which the proportion of the basic layer is about 23.8%, the proportion of the technical layer is about 17.3%, and the proportion of the application layer is about 58.9% [5].

2.2.2. From the Perspective of Application Scenario

At present, domestic AI technology is continuously accelerating its penetration into industries, medical treatment, agriculture and other fields. The actual application scenario continues to expand to a series of subdivided fields, mainly in the way of "AI+", enabling various industries, so as to promote its high-quality development. With the implementation of the notice on AI technology demonstration application scenarios prepared by the Ministry of Science and Technology, a large number of application scenarios began to become the construction content of China's key support [6], including "smart farm", "smart factory", "automatic driving" and "intelligent education".

3. Analysis of Basic Characteristics of Distance Education based on Artificial Intelligence

At present, according to some documents implemented by the Ministry of Education, distance education can also be called "online education", which is a relatively new form of education. It mainly refers to the mode of carrying out educational and teaching activities with the help of a series of media such as television and the Internet, which can break the restrictions of time and space and improve the freedom of educational and teaching activities. Through the rational use of this teaching mode, learners generally do not need to enter a specific place for classes, and can learn and receive education anytime and anywhere. For example, learners can achieve mutual learning through multiple channels such as television broadcasting, online live broadcast and tutoring special line. As far as distance education is concerned, it is a new concept generated after the gradual application of modern network information technology in the field of education, that is, education and teaching activities carried out by using network technology and environment. Its definition mainly includes narrow sense and broad sense [7], as follows.

3.1. Distance Education in a Narrow Sense

It mainly refers to a series of practical activities in which specific corresponding educational organizations collect, design, develop and use a series of educational resources to create an educational environment, and use these technologies, resources and environments to effectively provide various educational and teaching services for learners, so as to help and promote learners to achieve the goal of distance learning.

3.2. Distance Education in a Broad Sense

It refers to an educational mode of systematic teaching and communication between learners and teachers or between learners and educational institutions by means of a series of media forms. It can also be seen as an educational activity of effectively transmitting the curriculum to learners in one or more places outside the school. China's distance education has developed in three stages, namely correspondence education, radio and television, and modern distance education, which has played an important role in cultivating talents and promoting the rapid development of social economy.

3.3. Basic Characteristics of Distance Education

With the effective support and help of artificial intelligence technology, modern distance education activities show the following basic characteristics.

3.3.1. High efficiency

Through the rational use of AI technology in distance education activities, it can effectively save the time of distance education teaching to a large extent, and help to improve the teaching efficiency and quality. For example, with the help of intelligent question answering system, 24-hour real-time online question answering can be realized, which can not only save the time for students to search for answers to questions, but also save the time for teachers to guide answers online, thus improving teaching efficiency. With the help of intelligent retrieval system, students and teachers can quickly find the resources they need in the massive resources, which can also further improve the efficiency and quality of teaching.

3.3.2. Accuracy

This is mainly reflected in the dynamic analysis of learners' own learning situation, the visualization of learning process and real-time warning of intelligent technology. With the help of AI technology, the long-term capture and analysis of learners' own learning behavior data can help teachers more comprehensively understand learners' cognitive and learning conditions [8], so as to predict and intervene learners' actual learning state more accurately.

3.3.3. Verisimilitude

This mainly refers to the construction of extremely realistic distance teaching situations with the help of artificial intelligence technology, so as to enhance the interactivity and high simulation of distance teaching activities, thus enhancing the attraction of teaching and realizing immersion teaching. At present, the commonly used technologies include VR technology, digital twinning technology, metauniverse and 5G technology, etc. Through the reasonable use of these technologies, we can build vivid teaching situations in distance education activities, so that learners can truly be in the real world, and help to further improve the efficiency and quality of distance education.

4. Analysis of the Impact of Ai on Distance Education under the New Situation

Under the new situation, it has become an inevitable trend for AI to be widely used in distance education. In this context, the combination of the two can have a great impact on teachers, learners and education managers, which can be reflected in the following aspects.

4.1. Impact on Teachers

First, as a teacher, you can accurately and effectively grasp and understand the personality characteristics required for learners' own growth. As far as distance education is concerned, it essentially belongs to an educational model that pays more attention to personalized learning [9]. With the introduction of AI technology, this personalization will become more obvious and prominent. For this kind of personalized learning, it not only includes that teachers should be able to teach students according to their aptitude in combination with learners' differences, but also emphasizes that a series of teaching services provided by teachers in actual teaching activities must have good personalized characteristics. In other words, teachers will no longer be simple "knowledge movers" in the past, but need to be transformed into coaches, leaders and organizers of all kinds of learning activities, as well as service providers and designers. Only in this way can we improve the teaching effectiveness of distance education and promote the continuous development of learners.

Second, teachers should enhance their sensitivity to data information. The application of artificial intelligence technology will promote distance education activities to gradually generate a large amount of data information in the actual process of development, and these data information can often have a decisive impact on the effectiveness of distance education, such as learners' learning feedback and evaluation information, learning status information, performance information, etc. Therefore, as a distance education teacher in the new situation, we must pay enough attention to data information, We should continue to enhance our sensitivity to various kinds of data and information, so as to ensure that we can collect, sort out, mine and use a series of valuable and meaningful information in time, and constantly optimize our education and teaching work, so as to promote the continuous improvement of our distance education and teaching level.

Third, under the new situation, the application of AI in the field of distance education will involve the use of a variety of advanced technical means, so teachers should be familiar with and able to effectively use various relevant technologies, software and systems, and even be able to design and develop a series of corresponding AI applications related to distance education. In addition, teachers also need to continue to enrich their relevant knowledge about AI distance education, and constantly improve AI education ability, so as to ensure that AI can be effectively and reasonably used in distance education activities.

4.2. Impact on Learners

First, in the era of artificial intelligence, distance learning content will become more precise and customized. At this stage, a series of learning contents of distance education learners mostly come from fixed resources in online courses, and these resources are generally provided or compiled by corresponding teachers [10]. Through the application of AI technology, teachers can effectively carry out data mining on the knowledge map of each learner in the background, so as to accurately and effectively grasp where each learner is prone to make mistakes and what needs to be improved. In this way, we can recommend a series of valuable and helpful knowledge points or exercise questions for learners more pertinently, which will help improve the learning efficiency and quality of learners, effectively teach students according to their aptitude, and greatly improve the learning effectiveness of learners.

Second, in the new situation, when AI actually imparts a series of core knowledge, it tends to be more targeted and accurate, and can guide and help learners to think deeply, which enables learners to carry out more research-oriented and creative learning activities, and helps improve learners' learning quality. In addition, AI can also track and record the actual learning process of each learner, so as to analyze and judge the problems and deficiencies or key and difficult points of the learners

in the whole learning activity, and then timely help the corresponding learners to make effective adjustments to the actual learning process, help each learner's own learning behavior to create a good learning model, and help further improve the learning effect.

Thirdly, the organic combination of AI and distance education can reduce the learning difficulty of learners, which will help improve learners' learning enthusiasm and help the smooth development of distance education. At the same time, AI can help learners make better use of fragmented time for learning, which can promote learners' learning activities to have certain sustainability and timeliness, and can help learners improve learning efficiency and quality to a large extent.

4.3. Impact on Education Management

First, after the integration of AI and corresponding distance learning platform, it can promote the platform to carry out real-time and dynamic supervision and monitoring of all learners' learning behaviors and teachers' counseling behaviors, and can plan specific learning guidance based on learners' actual learning conditions, learning progress and effects, and can also provide reasonable and effective intellectual support for teachers' counseling work. These are conducive to the continuous improvement of teaching efficiency and quality of distance education. That is to say, AI will act as a teacher, manager, monitor, guide and assistant in the whole distance education activities [11], which provides strong technical support and guarantee for the high-quality development of distance education.

Second, for modern distance education, although it has been able to carry out online examination activities based on the topic and give the final results of learners in real time, for this online examination model with random questions, it is not completely effective to investigate and test the actual learning results of each learner at this stage. However, for AI, it can automatically prepare or select test questions based on the massive learning data information gradually accumulated by learners during their daily learning activities, which makes the test focus that each learner needs to face different, so that it can test a series of learners' learning results more purposefully and pertinently, which is conducive to promoting learners' comprehensive and personalized development, It can also select and shape talents more fairly and reasonably.

5. Research on the Application of AI in Distance Education under the New Situation

At present, learning support, examination, teaching resources and other aspects of distance education activities have achieved a high level of informatization, and the informatization teaching mode is gradually becoming more perfect. With the effective integration of artificial intelligence, these aspects will undergo major changes and be applied in the following areas, and will continue to develop in a better direction.

5.1. Application of Intelligent Robot

For intelligent robot, it is a typical representative of artificial intelligence and has been widely used in many fields at this stage. This kind of robot has certain independent perception ability, behavior ability and thinking ability. It can spontaneously and effectively sense the external environment, and at the same time can adapt to a series of changes in the environment independently. It can also continuously improve its ability to adapt to the environment through learning. Applying intelligent robots to distance education can effectively complete a series of complex or labor-intensive activities, which can further improve the efficiency and quality of distance education teaching activities.

For example, a domestic company has independently developed a distance education robot based on cloud computing technology [12], which has installed a distance education control system inside, and has set up a teacher end, a parent end and a student end respectively. The parent end and the student end can carry out differentiated login through the management system, and can use relevant functions after effectively completing the login activity, For example, as shown in Figure 1,24-hour online Q&A, full text memory and real-time answers to complex questions. The robot can also realize position movement through multiple sets of wheels, and effectively carry out intelligent screen interaction with the help of entertainment interaction module and control system, so as to achieve the purpose of interactive entertainment. In addition, the robot also has a camera adjustment and monitoring system. Parents and teachers can adjust the camera terminal, and the monitoring system can carry out real-time dynamic monitoring on the actual learning of students. For this distance intelligent education robot, it not only improves the learning efficiency of learners, but also optimizes the learning environment of learners in distance education, which helps to further improve the learning quality.

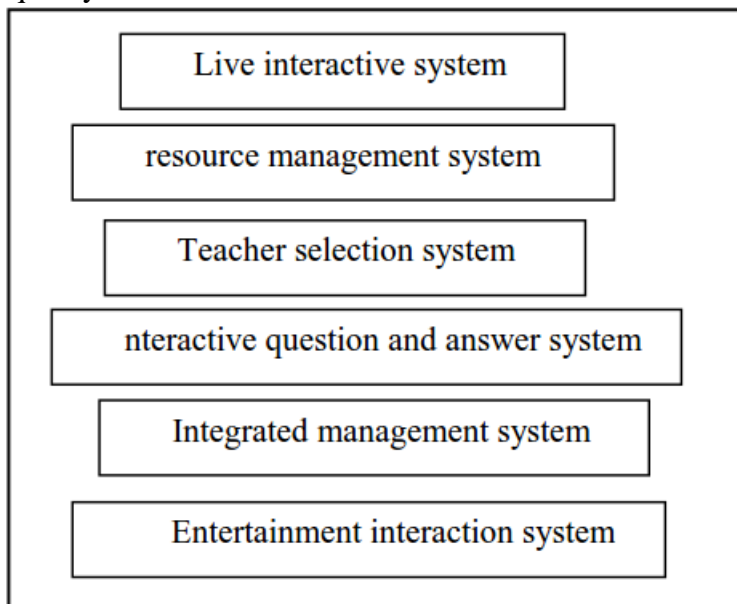


Figure 1: Student terminal function of intelligent robot in distance education

5.2. Application of Intelligent Learning Guidance System

For intelligent learning guidance system, it is a key way to improve the intelligence of distance education activities at this stage. The intelligent learning guidance system was officially born in the 1990s. At this time, the design of the system mainly integrates a series of modern theoretical knowledge such as pedagogy and cognitive science, which can effectively provide learners with a variety of distance education services such as independent problem setting and scaffolding feedback. At this stage, the intelligent learning guidance system is following the development and change of distance education, and its functions are becoming more and more abundant. The specific functions that can be realized are as follows.

1) With the help of a series of internally set learner modules, in addition to the above functions, it can also track and record the cognitive changes of learners themselves, and then make timely and effective updates to their learning content, so as to promote learners to achieve ladder progress.

2) It can carry out multi-dimensional modeling for learners and accurately push a series of high-quality learning resources in combination with learners' own cognitive situation.

3) It is able to set corresponding interactive pages in line with the teaching characteristics, so as to enhance the fun of teaching activities and increase the learning frequency of learners.

In addition, under the background of the continuous development and progress of various artificial intelligence technologies, the intelligent learning guidance system has also begun to involve more and more complex functions and has relatively open knowledge and information of relevant disciplines, and can accurately mark and introduce various kinds of knowledge information.

For example, natural language technology can promote the intelligent learning guidance system to fully realize the classroom communication of distance learning activities in the form of dialogue; Data mining, in-depth learning and other relevant technical means can carry out in-depth analysis and evaluation of information data in the whole process of distance education, thus helping to create a more applicable and diversified learner model and automatic marking model [13]. Combined with the results of inspection and review, the intelligent learning guidance system can also provide learners with intelligent feedback and push activities for various high-quality review materials. Through the application of a series of knowledge visualization technologies such as knowledge map, the intelligent learning guidance system can also achieve personalized development in learning guidance and dynamically plan learning routes for learners. At the same time, it can also regularly generate highly targeted learning reports, which enables the intelligent learning guidance system to provide support and help for a series of corresponding learners at different stages, it is helpful to greatly improve the efficiency and quality of distance education.

5.3. Application of Intelligent Teaching Platform

Intelligent teaching platform is an AI technology commonly used in the field of distance education at this stage. The platform needs to effectively input the key data of learners, including the specific time period for learners to log in to the platform, the type of terminal, the length of learning, and the content of learning interaction. On this basis, the intelligent teaching platform can effectively define the specific learning characteristics of each learner with the help of user portrait technology, and combine these characteristics to scientifically and accurately carry out learning effect feedback activities or push relevant learning content for learners. At the same time, it can also intelligently guide learners to carry out distance learning activities with the help of a series of functional modules such as intelligent learning reminder, learning effect analysis and reports. In addition, in order to further improve learners' participation in distance education, the intelligent teaching platform can also effectively transform the relevant assessment forms of some courses into formative assessment, that is, integrate the length of learners' course learning and browsing time, the number of learners' interactions and the actual completion of homework, and automatically calculate the course scores of learners according to a certain proportion. It is helpful to improve the scientificity and rationality of assessment. In this way, teachers can adjust and control the way and method of distance education from the overall perspective, avoid the blindness and randomness of the assessment work caused by the examination results only, and promote the continuous and effective improvement of teaching effectiveness.

5.4. Application of Intelligent Simulation

In the actual development of distance education activities, experimental teaching often belongs to the key and difficult content for some engineering professional courses. At present, in most distance education teaching activities, it is often difficult to carry out corresponding practical activities, which makes it difficult to further improve the effectiveness of the corresponding distance education work. Through the rational use of intelligent simulation technology, this problem can be effectively solved. Using this technology to design and develop an intelligent simulation

experiment teaching platform can greatly improve the efficiency and quality of distance education practice teaching.

For example, IOCLASS is an intelligent simulation practice teaching platform with strong openness and sharing [14]. At this stage, it mainly provides simulation experiment services for teachers, distance education learners and college students. It has many functions, including video education, online question answering, examination and marking activities, and can support remote simulation experiments, issue experiment reports, and carry out course sharing.

5.5. Application of Remote Online Examination

Online examination is an important means of teaching assessment in modern distance education activities. With the help of the intelligent examination management system, the rationality and scientificity of the examination can be further improved, thus helping to promote the effectiveness of distance education.

For example, as a teacher, he can effectively prepare the examination questions in the examination room with the help of the question bank management function; With the help of the test paper management system, the test paper can be made in the form of fixed test paper or random test paper or a combination of both; With the help of the system management module, teachers can reasonably set the test time and method, and give examinees the right to use and register at the same time; For learners, the system can receive test papers and take part in the test at the same time, and then effectively complete the test according to the specified test time. After that, the teacher uses the statistical analysis module to complete the statistical analysis of the test paper resources, and makes full use of the combination of computer intelligent marking and manual marking to quickly complete the marking and revision of a series of test papers, which can effectively count and analyze the learners' achievements and errors.

This kind of intelligent examination management system has a very flexible and comprehensive method of problem setting, which can carry out a more objective and fair evaluation of learners, at the same time, it can also help teachers to better understand and master a series of knowledge learned by learners, and can significantly reduce the workload of marking and problem setting, and can improve the efficiency and quality of distance education tests while saving teachers' time and energy.

5.6. Application in Learning Services

At the present stage, distance education activities pay more attention to personalized learning, and for personalized learning, it cannot be separated from the help and support of a series of personalized learning services. These learning services themselves are the important premise and guarantee to meet the actual needs of personalized learning of learners. The learning support service of traditional distance education is generally provided by a series of fixed full-time teachers. With the continuous development of distance education, it gradually develops into all front-line teachers, so as to improve the timeliness and effectiveness of the service. For this kind of learning service work, AI can be fully applied because many problems can be solved intelligently with the help of the corresponding problem knowledge base created by AI, such as intelligent customer service system, which can not only improve the timeliness and effectiveness of learning service [15], but also effectively save more time and energy for learners and teachers to a certain extent.

For the intelligent customer service system, it uses a relatively large number of technologies, including natural language processing and text voice image analysis technology and a series of intelligent technologies [16]. With the effective building of the knowledge base, it can automatically respond to questions raised by learners. For example, by building a knowledge

database for distance education, and then connecting with the intelligent customer service system, the system can provide more convenient and effective learning services for relevant learners through a series of ways such as learning platform, telephone and WeChat official account, which helps to improve the learning efficiency and quality of learners.

5.7. Build Realistic Learning Environment with Artificial Intelligence

For the traditional education model, teaching activities need to include learners, teachers and the classroom, but in distance education, there is no classroom, which makes it difficult to effectively carry out teaching supervision and other work, and will lack a certain learning atmosphere, which is difficult to stimulate and mobilize the learning interest of learners, thus easily affecting the effectiveness of education and teaching. This emphasizes the need to introduce virtual reality technology into distance education activities, such as VR technology, which is a typical representative of the current virtual reality technology. This technology can build a more realistic learning situation with the help of network simulation, which makes learners feel as if they are in the situation. This can greatly improve the reality of classroom teaching, help to make up for the shortcomings of distance education, and this relatively advanced science and technology can also fully stimulate the curiosity and learning interest of learners, help to enhance their learning initiative, and greatly improve the teaching efficiency [17]. Therefore, we can try to introduce virtual reality technology into distance education and build a network virtual classroom to promote the continuous development of distance education activities.

5.8. Application in the Retrieval of Teaching Resources

For distance education, its teaching resources have a series of characteristics such as too large amount of information, diversified media types, scattered storage and diverse forms of expression. This makes the teaching resource library in distance education usually store a large number of resources with different types, such as audio, video, plain text, pictures, RTF or HTML files. In the face of this huge amount of information resources, how to let teachers or learners quickly and accurately find the resources they need is a problem that needs to be highly valued in distance education teaching activities. For the former teaching resource system, it usually carries out teaching resource management with the help of tree structure. On the premise that the number of teaching resources is not large and the classification information is clear, learners or teachers can easily grasp a series of required resources. However, if the number of resources in the system gradually reaches a certain scale through continuous expansion, learners or teachers will easily get lost in the tree structure of the system itself, which makes it difficult to find the resources they need quickly and accurately. Therefore, when carrying out the construction of teaching resources in the field of distance education, it is necessary to build an intelligent retrieval system to further improve the retrieval effect of learners or teachers on various resources.

For example, the intelligent retrieval system based on XML and natural language processing technology can help relevant learners and teachers to achieve the goal of fast and accurate access to required resources [18]. The system can be divided into two main subsystems: resource preprocessing and resource retrieval. The resource pre-processing system is mainly used to obtain the meta information of a series of resources and describe them at the same time, and then build an index database of resource meta information by virtue of Chinese information processing technology and index technology. In addition, the system is also responsible for effectively building thesaurus and related thesaurus, which is mainly used to expand keywords, so as to achieve the purpose of intelligent retrieval. For the resource retrieval system, it is mainly responsible for analyzing a series of requests submitted by users independently, and then completing intelligent

information retrieval efficiently according to the information in the index database, thesaurus and related thesaurus [19]. For the intelligent retrieval system, it can use the word segmentation technology in Chinese information processing to promote users to effectively submit relevant query requests in natural language description without having to input corresponding query conditions according to the form of keywords, which can greatly improve the efficiency and quality of retrieval.

6. Conclusions

To sum up, under the new situation, artificial intelligence technology will continue to develop and progress, and it will also be more widely popularized and applied in all fields of society, and its value and role will inevitably become greater and greater. Distance education, as a widely used education model in China's education, can play an extremely important role in promoting the continuous improvement of national quality and other aspects. By integrating artificial intelligence technology into distance education activities, the role of distance education can be fully played. For this reason, the article has made an in-depth discussion on the impact of AI on distance education and its specific application under the new situation, so as to improve the effectiveness of distance education and promote relevant learners to achieve better development.

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