

Research on the Reform of Education and Teaching Methods in the Era of Artificial Intelligence

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ABSTRACT

With the development and application of artificial intelligence technology, human society has gradually entered the era of artificial intelligence, which will inevitably have a profound impact on the field of education. The purpose of this study is to explore the path and method of promoting education and teaching reform in the era of artificial intelligence through theoretical and technical analysis. Based on the analysis of education reform, distributed cognition, technology innovation and other theories, this study summarizes the theoretical path to promote the combination of artificial intelligence and education and teaching reform. It is found that natural language processing, big data analysis, computer vision, speech recognition and machine learning can promote the application of artificial intelligence technology in education and teaching reform, and these technologies establish a technical path for the reform of education and teaching. Combined with the above analysis, this paper puts forward the methods of education and teaching reform in the era of artificial intelligence from five aspects: subject setting, curriculum construction, course content, teaching staff and teaching implementation.

Keywords: *Artificial intelligence, education, teaching, reform*

1. INTRODUCTION

Artificial intelligence is a new technology science that develops and researches human intelligence based on simulation, extension and expansion, and it is a branch of computer science. In recent years, due to the rapid development of AI theory, method, technology and application system, such as the extensive application of search engine, smart phone, intelligent medical treatment, face recognition and other products and technologies, which have brought about changes in social life and work, human society is accelerating into a new stage of collaborative work and live together with AI, and the era of AI has already arrived. In this context, artificial intelligence will inevitably have an impact and change on the education and teaching of human society. On the one hand, making full use of and exploring the role of artificial intelligence in optimizing education management, improving teachers' teaching ability, improving students' learning quality, etc. can enable education management departments to better plan education policies; on the other hand, researching and predicting the development and application of artificial intelligence technology can promote education management departments to think about future jobs and employment change of skill needs, and set up reasonable discipline. In 2017, the State Council issued the development plan for the new generation of artificial intelligence. In this document, the concept of "intelligent education" is clearly put forward. The purpose is to

excavate and use artificial intelligence technology to accelerate education reform, innovate talent training mode, and change teaching methods. In 2018, the Ministry of Education issued an action plan for innovation of artificial intelligence in colleges and universities. The document pointed out that in the era of artificial intelligence, colleges and universities need to strengthen the deep integration of artificial intelligence, education and teaching, and change education and teaching methods. It can be seen that China has foreseen the role of artificial intelligence technology in the field of education, and has also taken the integration of artificial intelligence technology and the promotion of educational intelligence as one of the goals of future educational reform.

2. THEORETICAL ANALYSIS

2.1. Theory of Educational Change

The theory of educational change holds that education has been in constant change, and change is the driving force to promote the dynamic development of education. Professor R. G. Havelock, a famous expert in educational reform theory, believes that there are two types of educational change, one is planned educational change, the other is natural educational change. Planned education reform refers to the deliberate reform of education by adopting a series of policy guidelines and various programs. Generally

speaking, the education revolution and education innovation belong to planned education reform; while natural education reform refers to the reform without special plans and programs, not implemented by people. It is a planned reform to promote the reform of education and teaching with the aid of artificial intelligence technology. The educational reform in the era of artificial intelligence is not the total negation of traditional teaching, but the optimization of education and learning process, the innovation of teaching and learning methods and means based on the integration of the advantages and connotations of traditional teaching mode. It is a systematic reform of the form of teaching resources, the organization of teaching activities, the form of learning activities and the way of learning evaluation [1].

2.2. Distributed Cognitive Theory

The theory of distributed cognition was put forward by Edwin Hutchins in the 1980s. The theory holds that cognition is distributed within individuals, among individuals, society, environment, media, culture and time. These distributed elements must interact with each other and rely on each other to complete cognitive tasks. The theory regards the whole participants, artificial products and their relationship in a specific environment as an analysis unit, and systematically considers all factors involved in cognitive activities. The core idea of the theory is that cognitive phenomena not only include cognitive activities in the individual's mind, but also include the process of realizing an activity through interaction between people and people, and between people and tools and technologies. It is of great significance to study the distributed cognitive theory in the context of the application of artificial intelligence technology to inspire the reform of education and teaching. On the one hand, as an "artifact" tool and technology, it can reduce cognitive load and transfer cognitive tasks. When learners encounter cognitive difficulties in the learning process, intelligent learning tools, software and other "artificial products" can help learners reduce the difficulty and load of cognition, and guide learners to complete cognitive tasks. As an individual like "human", learners can carry out deeper and creative cognitive activities, while those simple and repetitive cognitive tasks can be completed by intelligent machines and technologies. Human computer cooperation has become a basic way for human beings to solve cognitive problems when facing complex problems. On the other hand, distributed cognitive theory holds that cognition is completed in the process of interaction between cognitive individuals and cognitive environment. Therefore, for teaching, interaction in teaching should include interaction between teachers and students, interaction between students and students, interaction between teachers and students and knowledge, interaction between teachers and students and machine, etc. It leads to the diversification of cognitive structure, and the intelligent teaching environment can create a variety of cognitive interaction ways, can reconstruct learning environment and

experience for learners, and can even affect learners through hearing, vision and touch, and strengthen individual cognition.

2.3. Theory of Technological Innovation

The theory of technological innovation is first put forward systematically by Joseph A. Schumpeter in his theory of economic development. He thinks that "innovation" is "the setting up of a new product in function", that is to realize a new combination of production factors and production conditions, and introduce it into the production system. The guiding significance of the theory of technological innovation for the reform of education and teaching lies in promoting the combination of technology and teaching and the cultivation of students' innovative ability. In fact, the application of artificial intelligence technology in education puts forward the requirements for the transformation of the thinking and teaching methods of educators, requiring them to use intelligent teaching tools to innovate the teaching and learning mode, change the teaching management mode, improve the teaching evaluation mechanism, promote the deep integration of artificial intelligence technology and education and teaching, and promote the innovation and development of education and Teaching [2]. For learners, in the environment of the great development of artificial intelligence technology, simple, mechanical and repetitive work will be replaced by machines. To maintain the advantages of machines, people must cultivate the unique ability of human intelligence, fully develop imagination, improve problem-solving ability, strengthen communication ability and improve artistic aesthetic ability, etc., and fully tap human's innovation and creativity.

3. TECHNICAL ANALYSIS

At present, the application of artificial intelligence technology in the reform of education and teaching is mainly embodied in two types: subjective application and auxiliary application. The subjective application refers to the dominant position of artificial intelligence technology in education system, such as intelligent tutor system, intelligent teaching robot, etc.; the auxiliary application refers to the function module and structure of artificial intelligence partially integrated into education and teaching links, playing some specific roles and functions, such as intelligent group function, intelligent learning evaluation function, etc. The main research fields of AI technology are natural language processing, big data analysis, computer vision, speech recognition and machine learning. These technologies are often integrated and interwoven, forming the technical basis of education and teaching reform [3].

3.1. Natural Language Processing

Natural language processing technology is composed of natural language understanding technology and natural language generation technology. The former enables the computer to understand the meaning of natural language text, and the latter enables the computer to express the given ideas and intentions in natural language text. The development goal of natural language processing technology is to avoid people spending a lot of time and energy to learn all kinds of obscure computer languages, let people use their most familiar and most used natural languages to operate computers, and realize natural language communication between human and computer.

3.2. Big Data Analysis

Big data analysis technology refers to the ability to process various types and forms of data, and obtain the information value of massive and high growth data in a new processing mode. Through data collection, storage and mining, big data analysis can find the relationship between known variables and make scientific and intelligent decisions. In the process of education and teaching, there are a lot of teaching data, and the targeted artificial intelligence analysis model can help teachers to find the deficiencies in teaching with the help of big data analysis technology, and provide improvement programs. The application level of AI in education and teaching depends on the upgrading and perfection of big data analysis technology.

3.3. Computer Vision

Computer vision technology aims to establish an artificial intelligence system that can obtain information from images or multi-dimensional data, and realize the function of using computers and cameras to replace human eyes to identify, track and measure targets. Through further processing of the captured images, it can generate images that are more suitable for human eyes to observe or instruments to test and detect.

3.4. Speech Recognition

Speech recognition is the most successful technology in the application of artificial intelligence, which includes feature extraction technology, pattern matching criteria and model training technology. Speech recognition technology solves the problem of making the machine understand the human speech content. It realizes the machine's recognition and understanding of the speech signal, and then transforms the content into the corresponding text or command.

3.5. Machine Learning

Machine learning is the core of artificial intelligence. This technology studies how to make machines have the same learning ability as human beings, how to simulate or realize human learning behaviour, so as to acquire new knowledge or skills and reorganize the existing knowledge structure to improve their own performance. Nowadays, to judge whether a system can be called "intelligence" is to see whether it has learning ability. At present, the research direction of machine learning is mainly divided into two categories: one is the study of traditional machine learning, which focuses on exploring the learning mechanism of simulated human; the other is to study how to effectively use information, and how to obtain hidden, effective and understandable knowledge from mass data in the big data environment.

4. THE WAY OF REFORM

4.1. Discipline Setting Integrates the Development of Artificial Intelligence Industry

In the era of artificial intelligence, with the transformation and upgrading of industrial structure, some traditional enterprises and jobs will gradually disappear, and new industries, enterprises and occupations will continue to emerge. Therefore, the discipline setting of schools must be adjusted with the changes of social environment and technological environment to meet the new needs of industrial structure [4]. For example, under the industrial mode of "artificial intelligence +", there are new fields such as robot control, intelligent logistics, intelligent games, virtual reality and so on. However, the supply of professional talents in these fields is obviously insufficient. Relevant colleges and universities should combine their own discipline advantages with the development of AI technology to add a new "artificial intelligence +" major. Because the intelligent production system in the era of artificial intelligence is gradually widely used in enterprises extensive application, which makes the workers need to adapt to the new work mode, master the knowledge and skills needed to complete all the work processes in the artificial intelligence environment, while as the future workers, the students need to master this knowledge and skills, effectively meet the professional needs of future jobs, often need to cross integrate the majors through colleges and universities to achieve such training objectives.

4.2. Curriculum Construction Meets the Demand of Intelligent Production

In the era of artificial intelligence, the intelligent production mode blurs the division of labour in the work process, weakens the hierarchical phenomenon of talent

structure in the traditional work system, and reconstructs the traditional production, sales, R & D and service mode. Therefore, the curriculum construction of colleges and universities needs to be changed from three aspects: curriculum development, curriculum structure and curriculum content. First of all, curriculum development needs to be based on the analysis of the work system, combined with the system, process, knowledge and skills in intelligent production to develop and set courses, and to cultivate students' professional ability to solve complex work tasks through course learning; secondly, the curriculum structure design needs to integrate the needs of intelligent production horizontal integration of courses in the same professional field, cross-border integration of courses in different professional fields, and training students to have overall and comprehensive professional ability [5].

4.3. The Course Content Has the Characteristics of Artificial Intelligence Era

In the era of artificial intelligence, curriculum content should integrate professional knowledge, interdisciplinary knowledge, artificial intelligence technology, professional skills and professionalism, and add data mining, deep learning and hybrid intelligence and other AI related curriculum content. In addition, we also need to integrate the ethics, security and privacy of the era of artificial intelligence into the curriculum to cultivate students' artificial intelligence literacy.

4.4. Teachers Improve the Level of Intelligent Specialty

In the era of artificial intelligence, it is an important guarantee to deepen the construction of teachers' team in an all-round way. Colleges and universities need to attach importance to the introduction of talents, promote the introduction of talents in the field of artificial intelligence, employ famous teachers in the field of artificial intelligence and enterprise experts with rich experience and excellent technology, build a high-level teaching team in the era of artificial intelligence, create conditions to encourage teachers to participate in special training and enterprise training, and strengthen the understanding and application of new technologies of artificial intelligence by teachers; Regularly employ technical experts of enterprises as part-time teachers of colleges and universities to enrich the diversity of teachers in colleges and universities; build an information-based learning and exchange platform to facilitate teachers to timely learn cutting-edge technology and understand technological trends through the internet.

4.5. The Implementation of Multi-directional Application of Artificial Intelligence in Teaching

The application of artificial intelligence is gradually changing the traditional teaching methods, learning methods and evaluation mechanisms, etc., which is conducive to promote the overall improvement of students' knowledge, skills and literacy. In the process of teaching implementation, multi-faceted application of artificial intelligence technology can improve the effect of teachers' teaching, students' learning, course tutor and teaching evaluation [6]. In the era of artificial intelligence, teachers use AR / VR virtual scene to carry out experiential teaching, which solves the problem that the traditional teaching process can not present those scenes described by language, and can demonstrate or implement the practice and operation courses that could not be carried out in the classroom, so that students can have a sense of immersive experience and enhance the effect of experiential learning. For example, as long as students wear the "Apollo 11" VR glasses designed by Ireland's "Immersive VR Education" company, they can "feel the whole process of Apollo 11 landing in person", such VR virtual scene teaching effect cannot be achieved with any language description teaching. Students use a variety of intelligent learning devices to complete the tasks assigned by teachers on the artificial intelligence learning platform. The learning progress and learning problems displayed in the learning process provide help for teachers to implement personalized teaching. The virtual teachers set up on the platform can also provide guidance for students without time and space constraints. For example, "Math Whizz" designed by "Whizz Education" company in London is a software product that uses artificial intelligence technology to guide mathematics online. Students can ask questions to virtual teachers at any time during the learning process of this product. Virtual teachers will adjust the way of answering questions according to students' feedback until helping students solve problems. The artificial intelligence system can evaluate each student's learning guidance data and each student's feedback data, so as to realize the accurate evaluation of teachers' teaching and promote the improvement of teaching quality.

5. CONCLUSION

In the era of artificial intelligence, the traditional education system has gradually entered into the modern intelligent education system integrated with artificial intelligence, information network and other technologies, which has constructed an intelligent, informative and diverse learning scene for our education and teaching. All of these will have a profound impact on future education and teaching. Timely reform of education mode, teaching method and learning method is helpful to cultivate talents needed for the society in the era of artificial intelligence.

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