

Exploring the Use of Artificial Intelligence in Teaching Management and Evaluation Based on Citation Space Analysis

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Abstract: This article examines the use of artificial intelligence in teaching management and teaching evaluation based on citation space analysis. First, the sources and development of artificial intelligence at home and abroad are presented, then the trend of artificial intelligence research in education is analyzed. Then, the application of artificial intelligence in education from two aspects - management and assessment of teaching, including intelligent teaching management systems and intelligent assessment systems - is examined in detail. Finally, directions for development and prospects for future applications of AI in teaching management and assessment are suggested.

Keywords: Artificial Intelligence; Teaching Management; Teaching Evaluation.

1. Introduction

At a time when artificial intelligence is increasingly becoming the center of global competition, the relationship between artificial intelligence and education has also become a hot topic. In order to rank high in the development of artificial intelligence, various relevant agencies in China have introduced a series of policies and activities at various levels of education [1].

On July 8, 2017, the Next Generation Artificial Intelligence Development Plan was officially released, focusing on building AI highways, spreading intelligent education, creating AI courses in elementary and secondary schools, and gradually popularizing programming education [1]. In 2018, the Department of Education released the Education Informatization Action Plan 2.0, which proposes to promote the use of AI throughout learning and management, and the use of modern intelligent information technology to facilitate significant changes in teacher training models and learning content [2]. The Master Plan for Deepening Educational Assessment Reform in the New Era proposes that the new era educational assessment system should use modern information technology, artificial intelligence, big data and other advanced technological tools to assess the entire learning process of all students vertically and the five elements of moral, intellectual, physical, social and aesthetic assessment horizontally [2]. Clearly, the integration of artificial intelligence technology into school education is an inevitable trend, and the use of intelligent technology to address educational development and advance educational reform has achieved resonance [3]. It will provide technical support for the implementation of personalized learning and will be a major force for the development of education, with broad prospects of application in the educational sector. Firstly, by accumulating and analyzing large amounts of data, AI technology can help students find learning problems and provide targeted recommendations, making teaching more convenient and effective. At the same time, AI technology has enormous potential to enhance individualized student

learning. By revealing information about students through large amounts of data, AI technology can help instructors understand how well students have mastered their knowledge and skills, and better assess and provide them with feedback.

2. Research Methodology and Literature Sources

In this paper, we searched relevant topics in the literature database of China Knowledge Network, and compiled and analyzed the literature based on this data. The keywords for the search were "AI education" "AI education management" "AI education evaluation" and "AI education status ". The search found literature published from 2003 to 2022. The search of topics on AI education in China Knowledge Base found a total of 463 relevant papers, which showed an uneven trend in different years from 2003 to 2022, with the total number of published papers increasing from year to year, especially after 2016, when the growth increased and the number of relevant research papers increased dramatically, indicating that the field of educational technology research Applications of Artificial Intelligence in Education and Teaching is getting more attention.

3. Artificial Intelligence

3.1. The Rise and Tide of Artificial Intelligence

Artificial Intelligence (AI) is an important branch of the computer science discipline that refers to the modeling, augmentation, and extension of human intelligence by artificial means or technology, so that some mechanical devices have the capacity for human thinking, or the automation of mental labor.

In 1956, the term "artificial intelligence" was first used at the Dartmouth Conference, which was the first ever conference on artificial intelligence and a milestone in the field of artificial intelligence that launched the international discipline of artificial intelligence, and therefore the conference was of great historical significance [4]. More than sixty years have passed since the term "artificial intelligence"

was coined. During this period there have been three important fluctuations in the development of AI. The first wave was from 1956 to 1966, and it marked the first introduction of the concept of artificial intelligence right at the Dartmouth Conference, which opened the study of artificial intelligence. The second wave of AI, from 1976 to 1986, marked the creation of large-scale AI programs in many countries to promote AI development. The third wave of AI began in 2006, marked by breakthroughs in deep learning and pattern recognition technologies. In particular, the introduction of the U.S. BRAIN program, the EU BRAIN program, and China's Next Generation Artificial Intelligence Development Plan have again generated widespread attention to the next generation of AI from all walks of life, and related research has made great progress, with a wide range of applications and development prospects [5].

3.2. Development of Domestic Artificial Intelligence

Compared to global AI development, China's AI development was relatively backward and uneven, questioned, criticized and even suppressed. However, after China's reform and opening up, AI development gradually reached maturity [4].

Since entering the 21st century, China's AI industry has gradually awakened and developed, and with strong policy support, it has continued to accelerate its development. Since 2013, China has adopted a series of AI-related policies and published a series of opinions and research reports; in 2017, the "first year of AI", the State Council promulgated the "Next Generation Artificial Intelligence Development Plan", providing a new theoretical framework and new policy environment for next-generation AI development; In recent years, the Chinese government has established a special agency to promote AI development. This body includes the Promotion Office and the Strategic Coordination Committee. Since 2018, the Chinese government has released several important reports on AI development, including "China AI Development Report 2018," "China AI Development Report (2019-2020)," and "China AI 2.0 Development Strategy Study." All these reports were jointly published by the relevant departments and research units.

Artificial Intelligence is now included in the national development strategy, and Chinese researchers, university professors and students are researching, studying, developing and applying it at all levels. China has made unprecedented advances in research and application in this field and has made important contributions to the development of other disciplines and the modernization of China [4].

4. A Review of Research on the Use of Artificial Intelligence in Instructional Management and Instructional Assessment

In the field of educational artificial intelligence, educational science is the main theory and artificial intelligence is the key technology. The integration of these two areas contributes to the real implementation of educational artificial intelligence and is gradually penetrating into the fields of "teaching, learning, examinations, assessment, management, and administration"[6]. This study intends to start with the aspects of "management" and "assessment" use CiteSpace to build a knowledge map of key

words about AI in teaching management and assessment of teaching by analyzing the literature on the Internet, and then analyze the application of AI in teaching management and assessment of teaching. This paper presents the current situation of the use of artificial intelligence in teaching management and assessment.

4.1. A Review of Research on the Use of Artificial Intelligence in Learning Management

Due to the rapid development of AI technology in China, it has become an important tool that is widely used in daily work and life. Therefore, strengthening AI teaching management is not only a necessity for education management, but also a way to develop AI[7]. This study uses CiteSpace to analyze the knowledge graph of the keywords of AI teaching management research. The keywords that were highlighted were "teacher role", "action orientation", "data mining" and "talent development". After searching for "Artificial Intelligence in Teaching Management" in China Knowledge Network, literature with high relevance of Artificial Intelligence in Teaching Management was retrieved and analyzed, and it was found that currently Artificial Intelligence in Teaching Management is mainly applied in the following aspects

4.1.1. Intelligent Computer-based Learning Aids

"Person-centeredness" and put students' subjectivity at the center of the system, shifting from transferring knowledge to developing their independent thinking and creativity. The roles of the teacher and the school have changed dramatically: they are no longer simply imparting knowledge, suggesting ideas, or controlling the situation. Instead, they have taken on a leading, facilitating, and supporting role. In this process, they are not only responsible for organizing, guiding, and helping students learn, but also for creating a good learning environment and conditions for students[8].

4.1.2. Modeling Learning Experiments

Experiments in some courses require sophisticated experimental equipment that is often not suitable for students to perform independently. Moreover, the whole process is very complicated and the learning time is very short, which is not conducive to students' practical work in the classroom. But in simulation experiments, the use of artificial intelligence in different areas and at different times can both improve the overall effectiveness of the experiment and compensate for some shortcomings of reality. In practice, the use of intelligent simulation learning experiments can both improve students' learning and allow them to fully experience the whole process of scientific investigation and achieve the desired learning effect[7].

4.1.3. Test Organization and Labeling

Whereas in primitive classroom teaching teachers were less effective in organizing and labeling test questions, now the entire assignment process can be accomplished with the help of artificial intelligence. An intelligent computer can automatically generate appropriate questions according to the teacher's specified knowledge score, question type, and difficulty, and combine them into a test. Marking can also be done by a smart computer. Smart marking not only speeds up the speed and efficiency of marking, but also reduces the teacher's workload because he or she does not have to mark in groups and in turn can do more work[7].

4.1.4. Intelligent Campus Security Management System

School is an important educational base, so its security is very important. Creating a comprehensive intelligent security system can ensure the safety of school teachers and students.

In general, artificial intelligence has penetrated into people's lives, work and learning, and is used to some extent in the management of teaching.

4.2. A Review of Research on the Use of Artificial Intelligence in Teaching Evaluation

Traditional assessment methods for education and learning are singular, assessment content is one-sided, knowledge transfer is valued at the expense of moral education, and assessments are valued at the expense of quality, and many problems are difficult to solve in the current technical environment[9]. The rapid development of a new generation of information technology, such as Internet+, big data, and artificial intelligence, has gradually led to the research on emotional assessment becoming intelligent. The development of intelligent and personalized education requires a comprehensive assessment of students, not limited to cognition, but focusing on their overall development, especially in terms of emotion[10]. The continuous development of new technologies such as big data and artificial intelligence has created favorable conditions for reform and innovation in the assessment of teaching in education, which promotes comprehensive assessment of the quality of education and teaching from all aspects of morals, intelligence, physical fitness, aesthetics and work, promotes the reconstruction of assessment methods and content, and provides a real path for reform and innovation in the assessment of teaching in education[9].

In 2001, the Department of Education proposed developing student initiative rather than just an emphasis on transferring knowledge and skills, and in 2017 the new curriculum included a requirement for "literacy in core subjects," meaning that teachers' teaching focus is no longer limited to "knowing" and "manipulating," but "emotion" is also an important indicator of "quality of teaching." "The focus of teachers' teaching is no longer limited to 'cognition' and 'manipulation,' but 'emotion' is also an important indicator of 'quality of teaching.' Emotions influence human perception and behavior in the learning process, and mastering students' emotions is important for the future development of intellectual education and personalized education[10]. In 2020, the Central Committee of the Communist Party of China and the State Council released the Master Plan for Deepening the Reform of Education Evaluation in the New Era, which emphasizes the distinctive features of the times and emphasizes "commitment to scientific, effective, result-oriented, value-based assessment and personalized education," It emphasizes "commitment to scientific, effective, result-oriented, process-oriented, value-based assessment, sound comprehensive This study analyzes the citespace keyword knowledge map of AI teaching assessment research, and some of the most prominent keywords in this aspect are "cooperative learning," "creative education," " " We see that intelligent education is no longer an approach to teaching based solely on achievement and outcomes, but focuses more on the emotional experience of students, their creativity and collaboration, and their ability to learn. Students' creativity and collaboration and a spirit of active and collaborative inquiry. With the development of artificial

intelligence technology, teacher assessment has changed in terms of assessment subjects, assessment content, assessment methods, and assessment results.

4.2.1. Assessment Subjects

Diversifying assessment subjects is a major focus of current educational assessment reform. Diversified assessment includes such forms as teacher self-assessment, teacher assessment of student learning and mastery, student self-assessment, student assessment of teacher teaching, and classroom assessment by auditors[2]. Diversification of teacher evaluation subjects promotes comprehensive, objective, professional and scientific evaluation of teachers, which contributes to the effectiveness of teacher teaching and the comprehensive development of students morally, intellectually, physically, aesthetically and socially.

4.2.2. Assessment Content

Traditional teaching assessment mainly evaluates the goals, content, instructional design, methods and outcomes of classroom instruction, focusing on students' mastery of knowledge and skills, while ignoring students' emotional experiences and value development. Classroom assessment based on artificial intelligence technology, on the other hand, can understand the emotional changes of teachers and students through AI analysis of their voice, facial expressions and body movements to achieve control over emotions in the classroom, improve students' motivation to learn and foster teacher-student relationships. Throughout the learning process, students will develop a positive attitude towards learning, which will lead them to a state of focus and engagement in the learning process and, as a result, a high quality of learning.

4.2.3. Assessment Methods

Traditional classroom instructional assessment is accomplished primarily through direct observation of teacher and student behavior during instruction, either by the teachers themselves or by experts. However, this method of evaluation has its shortcomings: first, on-site evaluation of public lessons by experts often differs significantly from normal classroom conditions because of careful teacher preparation and special attention from students, resulting in a lack of credibility; second, experts use a fixed rating indicator to grade, but the rating indicator is often vague and difficult to judge. By applying AI to assess classroom teaching, teachers can monitor students' learning status by using AI to record the number of hands raised by students during class and their behavior during criticism, which is automatically evaluated and analyzed by AI technology and can help teachers make timely adjustments to their own classroom behavior. In terms of classroom instructional support, AI technology can be used to help manage and evaluate instructional content, assignments, and teacher-student interactions. For example, all videos in course resources can be intelligently recommended and categorized based on knowledge mapping technology; computer vision technology can be used to analyze data such as student completion of assignments and number of submissions to assess student status in the course and identify problems in a timely manner; deep learning algorithms can be used to intelligently analyze information such as student responses to questions to aid in classroom assessment.

4.2.4. Outcome Assessment

Traditionally, assessment of student academic status has been measured by subject examinations, and assessment of

student academic performance is usually based on milestone results as an indicator and in the form of summative assessments for each subject in each grade. The results are unlikely to reflect the quality of teaching and learning in the classroom, nor can they fully reflect the role of assessment feedback in improving student academic status, thereby failing to reflect the results do not reflect the quality of teaching and learning in the classroom and do not provide sufficient feedback to improve student learning.

AI-based classroom assessment captures various behaviors of teachers and students in the classroom during instruction and conducts process evaluations. Data processing generates reports on student learning in the classroom as well as reports on diagnostic analysis of classroom instruction that are shared with teachers. Classroom teaching assessment data charts can also be generated to provide teachers with reference data to provide individualized guidance based on classroom teaching. Assessment of classroom instruction with artificial intelligence is data-driven, providing teachers with more focused instructional guidance and allowing for deeper analysis and accurate judgment of data-driven assessment results.

5. Further Improving the Use of Artificial Intelligence in Instructional Management and Assessment

As China's education reform deepens, the role of AI education in Chinese education becomes more and more important, and its role becomes more apparent. How to maximize the use of AI technology in education so that its role in education management and evaluation becomes more prominent is becoming increasingly important. At present, however, there are still some shortcomings in the application of AI technology in education, mainly in the following areas:

First, the combination of education scenarios and AI technologies is not close enough. For example, big data in education can only solve part of the problem of assisted learning, but the educational scene is a complex system, and further in-depth research is needed on how to apply these data and algorithms at different levels and in different scenarios.

Second, there are serious obstacles to creating and managing educational data and information systems. The current lack of an effective platform for educational data collection and the absence of a common data center for teachers, students, and schools leads to many obstacles in the process of data collection and management.

Third, there is great confusion among teachers and schools about the use of AI technology. On the one hand, schools lack confidence in using AI technology to improve teaching and learning; on the other hand, schools are unsure whether AI technology will affect teacher-student relationships and teacher-student communication; in addition, many teachers are more skeptical about the effectiveness of using AI technology.

Fourth, the application of AI in education needs more reasonable policies and legal protection. The government should speed up the development of relevant regulations, formulate perfect norms and standards, clarify the legal status and rights, responsibilities and obligations of the application of AI in education, guarantee the healthy and orderly

development of AI in education and at the same time strengthen supervision. With the advent of the era of artificial intelligence, the government should play a guiding role and strengthen supervision and management of the application of artificial intelligence technology in education.

6. Concluding Observations

At present, the application of AI technology in teaching management and evaluation is still in the research and experimentation stage, and it is necessary to continuously improve AI teaching management systems, improve technical methods and implement management models to promote the refined and scientific development of AI and achieve innovation in education and teaching management. In order to deepen the development and promotion of AI course evaluation in the future, it is necessary to explore personalized teacher evaluation indicators, strengthen personalized teacher feedback, explore and optimize data collection, processing and analysis methods in AI evaluation models, and improve the scientific and rational nature of data generation methods in view of the development of future educational tasks.

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