Research on the Present Situation and Development Trend of Artificial Intelligence Teaching Evaluation

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ABSTRACT

With the rapid development of information technology, a new generation of information technology is pregnant with fundamental changes in the field of education. The purpose of artificial intelligence is to fundamentally change the traditional teaching evaluation. It is developing rapidly in the field of teaching evaluation. This paper uses CiteSpace software to visually analyze the literature of artificial intelligence teaching evaluation from 2000 to 2021. We use author organization co-occurrence map, keyword co-occurrence map, keyword clustering map and keyword time zone map for analysis. Then it summarizes the research status, research hotspots and possible development trends in this research field. The purpose is to make us have a clear understanding of the development of this field. Finally, through the analysis of this field, we put forward our own suggestions on the existing problems. It provides a certain reference for researchers studying artificial intelligence teaching evaluation.

Keywords: *Artificial intelligence, Teaching evaluation, Artificial intelligence empowerment, Citespace, Visual analysis, Knowledge map*

1. INTRODUCTION

Since the concept of artificial intelligence(AI) was first put forward in 1956, after more than 60 years of development, the information environment and data base of artificial intelligence have undergone profound changes [11]. Artificial intelligence has rapidly expanded from other fields to the field of education, bringing new opportunities and challenges for people to reshape the educational form and strengthen the nature of education. The Research Report on the implementation and application of global AI education in 2021 released in 2021 pointed out that China has become one of the leading countries in the policy support of" AI+education" [5]. Although the application of artificial intelligence in the field of education has received extensive attention, at present, the educational application of artificial intelligence in China is still at the stage of "empowering education of artificial intelligence technology", that is, "AI+education". To realize the deep integration and development of artificial intelligence and education, we must pay attention to the change of artificial intelligence in the specific stage of education and teaching. Based on CNKI, this study analyzes the literature of AI teaching evaluation from 2000 to 2021, combing the research status and hot spots in recent 20 years with Citespace, and forecasting the research trend, so as to provide some reference and help for the researchers of AI teaching evaluation in the future.

2. DATA AND METHODS

2.1. Data sources

In order to objectively analyze the research status and hot spots of "Artificial Intelligence Teaching Evaluation" in China, this research takes the famous

"China Knowledge Network" as the database to conduct relevant retrieval. The author has made the following thoughts on how to conduct literature search.

Through thinking and analysis from two different angles, this study finally decided to bring facial expression recognition, action recognition and attention analysis into the category of artificial intelligence, and also bring formative evaluation, process evaluation and summative evaluation into teaching evaluation;

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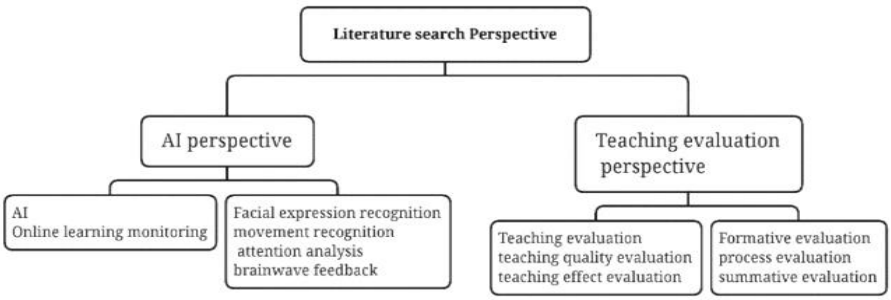

Figure1: Thinking of literature search

the search span was set from January 2000 to December 2021, and the topics and keywords shown in Table 1 below were used for literature search and screening. Finally, 110 qualified literatures were obtained as the research sample of this study.

Table 1: Key to literature

the theme	keywords	number	cleaning
AI teaching evaluation		86	59
AI	teaching evaluation	44	5
	AI teaching evaluation	4	2
Teaching quality evaluation	AI	11	4
Teaching evaluation	AI	13	5
Facial expression recognition	teaching evaluation	8	5
Action recognition	teaching evaluation	2	2
Attention analysis	teaching evaluation	2	1
Formative evaluation of AI		17	10
Procedural evaluation of AI		15	14
Summative evaluation of AI		6	3
summation			110
Duplicate results per search are not counted			

2.2. Research methods and tools

The author visually presents the literature through Citespace, and deeply analyzes the literature in the field of "artificial intelligence teaching evaluation". Through the analysis of keyword co-occurrence map, cluster map, time zone map, author co-occurrence map, etc., the research status in this field is combed in detail. At the same time, according to the map, the current research hotspots are analyzed, and some problems existing in this research field in China at present are pointed out, and appropriate suggestions are put forward.

3. RESEARCH RESULTS

Through the visual analysis of authors, institutions and keywords by citespace, this paper tries to reveal the research frontier and present situation of artificial intelligence teaching evaluation in China.

3.1. Research status

3.1.1. Research Status 1: A certain research team has been formed, but this field is still in the initial development stage.

Firstly.through the visual analysis of the collaboration map of the author, the author got 163 nodes and 139 connections, as shown in the following figure 2:

Figure2: Atlas of cooperation between authors and institutions(photo credit:original)

Table 2: Author & Number of Articles Issued by Institutions

count	Year	Authors | Institutions
22	2000	Yan Tao
20	2000	School of Information Engineering, Putian University
19	2000	Gao Fei
19	2000	Chen Deli
2	2014	Xue Jing
2	2018	Gao Huawei
2	2021	Xu Huanqing
2	2018	School of Information, Yunnan Normal University
2	2017	Li Yang
2	2021	Huang Fangliang
2	2021	School of Medical Information Engineering, Anhui University of Traditional Chinese Medicine

According to the above figure and table, it is found that:

(1) Since 2000, this field has been gradually valued by educational researchers, and different research groups have been formed.

Most of the research institutions shown in the figure are universities in China, and few primary and secondary schools are distributed among them, which is in line with the output ways of general research; secondly, although the authors and institutions in the picture are scattered, they have obviously formed 8 or more research teams.

(2) After 2000, this field entered a relatively cold period.

As shown in Table 2 above, it is not difficult to find that the number of posts published in 2000 was relatively large, but it didn't start to increase until 2014 after 2000. This may also be due to the limited technical conditions at that time, so the research in this field was relatively slow.

3.1.2. Research status 2: There is a close relationship between artificial intelligence and teaching evaluation, but it still stays in the enabling stage of artificial intelligence. It gradually develops to the stage of value breakthrough.

Through keyword co-occurrence analysis of sample literature, the author got 189 nodes and 398 connections,The partial view is shown below.

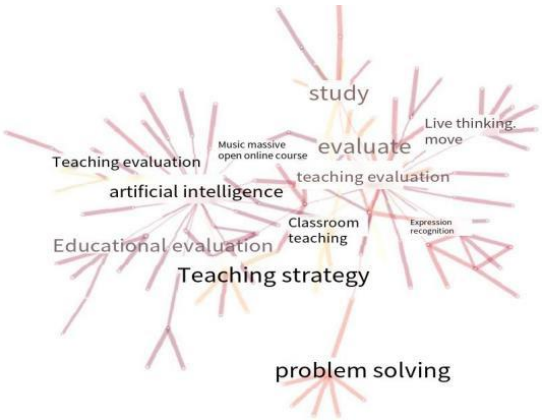

Figure3: Keywords co-occurrence atlas (photo credit:original)

Through the keyword co-occurrence map, it can be observed that there are two biggest nodes in the map: teaching evaluation and artificial intelligence, which means that these two words are the most common words in this research sample, and there is a very close relationship between them. When the threshold is set to 3, it can be observed that:

The author found that the relationship between the two is mainly through the connection of principles, concepts, specific equipment and tools, which also shows that the relationship between artificial intelligence and teaching evaluation is still in the initial stage of development. Researchers are trying to understand the basic meaning of artificial intelligence teaching evaluation, and try to make use of available instruments and equipment to conduct artificial intelligence teaching evaluation. Thus, using simple artificial intelligence technology for teaching evaluation to improve efficiency is often called artificial intelligence empowerment [5]. In addition to the simple application of artificial intelligence technology mentioned above, the author also found that in teaching evaluation, researchers use artificial intelligence technologies such as expression recognition and face detection to pay attention to learners' learning changes and try to innovate teaching ideas and methods, which shows that this field is developing in depth towards the value breakthrough stage at present.

3.1.3. Research Status 3: At present, the research of artificial intelligence teaching evaluation in China mainly focuses on three aspects. [4]

Artificial intelligence mainly focuses on teaching evaluation,teaching strategy,teaching reform, learning analysis and other topics.Teaching evaluation mainly focuses on information technology projects,AI applications, programming, learning records and other topics [5]. It seems that the concepts of the two are not very big,but after careful observation, in fact, their

research themes are mainly around the following three aspects:

(1) Pay attention to the research of AI teaching evaluation technology.

(2) Pay attention to the practical application research of artificial intelligence teaching evaluation.

(3) Pay attention to the research on the construction of artificial intelligence teaching evaluation system.

3.2. Research hotspots

Only by interpreting the research hotspots in this field can we grasp the research direction and theme in this field. Although the keywords in an article do not occupy a large space in the article, they are the core and essence of the article, and they are highly summarized and concentrated descriptions of the topic of the article [1]. Therefore, the keywords with high frequency are often used to determine a hot spot in the research field [2].

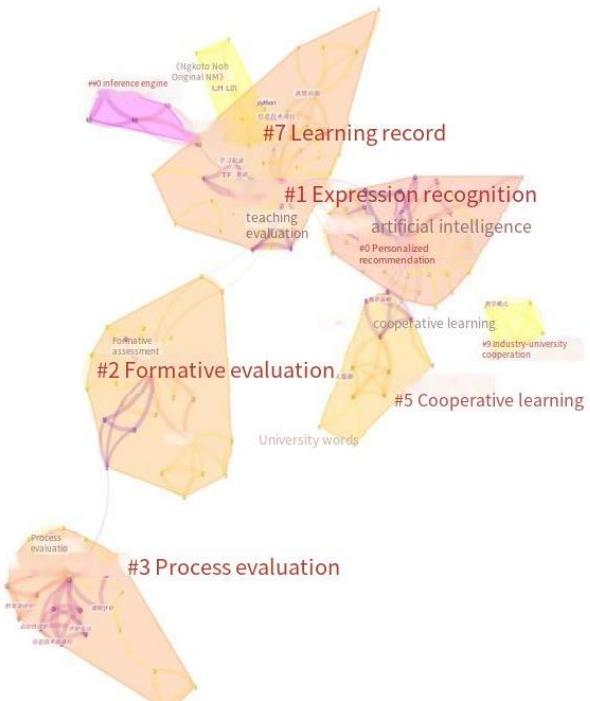

Figure 4: Keyword clustering(photo credit:original)

Through the cluster analysis of key words,the author observes that the cluster groups are personalized recommendation,expression record,industry-university cooperation,cooperative learning, learning record,inference engine,formative evaluation and process evaluation.After analysis,the following research hotspots in the field of artificial intelligence are finally obtained:

3.2.1. Hotspot1: Big data collection of student behavior based on artificial intelligence technology.

In the teaching evaluation of artificial intelligence, researchers are trying to record students' behaviors intelligently,and make evaluation feedback on students' behaviors by using artificial intelligence technology.

3.2.2. Hotspot 2: Expression recognition is being applied to teaching evaluation.

Expression recognition is a way of face recognition, and face recognition is an important technology in artificial intelligence [10]. It can analyze students' feelings and experiences in class through the recognition of students' facial expressions in class, combined with related theories of psychology and cognitive science, so as to make a scientific evaluation of teaching.

3.2.3. Hotspot 3: Personalized recommendation based on artificial intelligence teaching evaluation

Personalization is considered to be one of the most effective tools to solve the problem of information overload [7]. Basically, the recommendation problem is to replace users in evaluating products that they have never seen [9]. Therefore, personalized recommendation based on artificial intelligence teaching evaluation can make recommendation more efficient and convenient.

3.2.4. Hotspot 4: The application of artificial intelligence in formative evaluation and process evaluation promotes the reform of educational and teaching concepts.

The application of artificial intelligence in teaching evaluation has fundamentally and gradually changed the traditional teaching ideas and teaching methods.

3.2.5. Hotspot5: The development of industry-university cooperation promotes the rapid development of artificial intelligence teaching evaluation.

Only by promoting the industry university cooperation of artificial intelligence teaching evaluation can we promote the rapid development of this field. Only when it meets the needs of social production can it adapt to the development of the times

3.3. Research and development trend

To some extent, the time distribution of keywords in a certain subject area reflects the progress speed and theoretical level of academic research in this field [8].According to the time zone view, this paper attempts

to explore the evolution process of research topics in this field, and roughly divides the research process into four stages from the time scale.

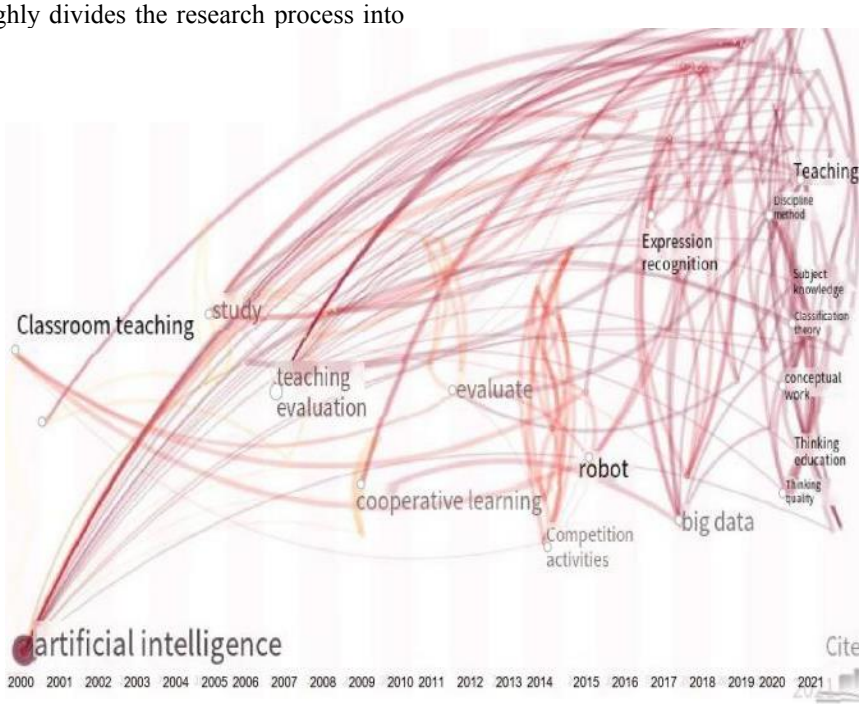

Figure5: Time zone diagram

Through the analysis of time zone diagram, researchers can grasp the research process of knowledge field from the time dimension. Through the observation of Figure 5, it can be roughly divided into four stages: First.2000 AI teaching evaluation appeared or already existed, and was suddenly taken seriously;second. From 2005 to 2010, the evaluation methods of artificial intelligence teaching were diversified;third. The teaching evaluation of artificial intelligence in 2014-2015 is tentatively applied in teaching practice;fourth. In 2017-2021, the evaluation of artificial intelligence teaching began to quantitatively analyze students' behaviors and make scientific evaluation by using diversified technologies. Based on this, the author summarizes the current development trends in this field as follows:

3.3.1. Development Trend 1: Teaching evaluation methods supported by artificial intelligence technology will be more diversified.

It can be seen from the figure that 2000 AI teaching evaluation has appeared or already existed. After several years of development, diversified evaluation methods such as portfolio evaluation and expression recognition have gradually appeared.

3.3.2. Development trend 2: With the support of artificial intelligence technology, teaching evaluation can be quantitatively analyzed, and the evaluation of students will be more scientific, objective and comprehensive.

It can be observed from the time zone diagram that the most obvious change from stage (1) to stage (4) is the introduction of artificial intelligence technology analysis means based on big data, which can capture the students' learning behavior and even the expression changes in the learning process, conduct objective quantitative learning analysis, and realize the objective and comprehensive teaching evaluation.

3.3.3. Development trend 3: The reform field may still be in the empowerment stage for a long time, but it will also develop to the value breakthrough stage.

According to the figure 5, it can be seen that artificial intelligence teaching evaluation gradually applies technology to specific subjects in the fourth stage. According to the development law presented in the figure, it can be speculated that artificial intelligence teaching evaluation may continue to develop and explore in specific subject areas for a long time. According to the "information technology project" in the fourth stage, that is, the cooperation between industry and university, the author infers that researcher have begun to focus on the value breakthrough of artificial intelligence teaching evaluation.

4. CONCLUSION

4.1. Summary

Teaching evaluation under artificial intelligence not only speeds up the process of evaluation, improves the

feedback effect of teaching evaluation on teachers' teaching and students' learning, but also realizes the efficient development of teaching evaluation [3]. Based on the literature review of artificial intelligence education in China in recent 20 years, this paper not only understands the current development status and research hotspots in this field, but also predicts a general development trend in this field. The appearance of artificial intelligence teaching evaluation has had a great impact on the reform of traditional education.

4.2. Suggestions

According to the analysis of the research status, research hotspots and research trends in this field, the author found that although the current artificial intelligence teaching evaluation is developing slowly, it is already at the bottleneck of artificial empowerment. To break through this stage, the author gave the following suggestions:

Firstly.Explore the path of teaching evaluation under the empowerment of artificial intelligence, and realize the path of artificial intelligence evaluation.

Secondly.Strive to realize the transformation from "AI+ education" to "artificial intelligence education", cultivate excellent artificial intelligence education talents, and promote the fundamental development of artificial intelligence teaching evaluation.

Thirdly.Vigorously promote the cooperation between industry and university,and realize the value breakthrough of artificial intelligence teaching evaluation.

In the face of the ever-changing world, only by grasping the critical period of technological development and change can we truly grasp the critical opportunity of educational change. Therefore, for the research of artificial intelligence teaching evaluation, researchers still need to invest a lot of time and energy, in order to promote the fundamental change of education and teaching evaluation in China.

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