Teachers' Professional Development Trends and Reflections from the Perspective of Smart Education

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Abstract

This paper sorts out the relevant research on the professional development of teachers in the context of smart education, and provides a reference for the research on the professional development of smart teachers in my country. Using the CiteSpace analysis software and the core journals of educational technology in the CNKI database as the data source, this paper analyzes the relevant literature data on teachers' professional development from the perspective of smart education, sorts out the research context, and explores the research on teachers' professional development from the perspective of smart education. Status and hotspots, and put forward two thoughts on helping smart teachers' personalized learning and development.

Keywords: *Smart teachers; Personalized learning; Artificial intelligence; Big data*

1 INTRODUCTION

With the development of emerging technologies such as artificial intelligence, big data, and cloud computing, the traditional classroom has been gradually transformed into an intelligent classroom teaching environment – a smart classroom. Therefore, the construction of a smart classroom teaching mode supported by emerging technologies is a hot topic in the exploration of the development of educational informatization today. With the development and popularization of smart classrooms, teachers in the form of smart education carry the task of cultivating students with high thinking quality, good at solving complex problems, outstanding innovation ability, and strong social adaptability [1]. How teachers implement efficient teaching in smart classrooms is a problem that needs to be solved urgently. The era of AI intelligence has changed the organizational structure, teaching environment, teaching content, teaching methods, etc. of education, posing new challenges for the professional development of teachers in the new era [2].

Therefore, how to meet the personalized learning of students and help teachers grow in a smart education environment supported by AI is also a problem that needs to be considered at present. It can be seen that the research on teacher training from the perspective of smart education has important practical significance for the professional training and development of smart teachers in China.

2 DATA SOURCES AND TOOLS

Emerging technologies such as big data, artificial intelligence, and cloud computing have been applied to the construction of smart classrooms and their classroom teaching, but there are few studies on teacher training from the perspective of smart education. Based on the CiteSpace knowledge graph research method and CNKI database, this paper takes "Smart Education + Teachers", "Smart Education + Teacher Professional Development", and "Smart Education + teacher's teaching and research" as the themes. The results are visually analyzed to explore the research context, hotspots, and trends of teachers' professional development from the perspective of smart education, and provide a reference for related research.

3 SITUATION ANALYSIS

3.1 Annual publication volume

According to the publication year, the distribution of papers in core journals in this field in CNKI is counted, and the number of papers produced in this research field

in a specific period is obtained, as shown in Figure 1. As can be seen from the figure, the number of publications in 2005-2010 was relatively small. Since 2010, domestic research on teacher professional development from the perspective of smart education has shown an increasing trend. Especially in 2019, the concept of "Smart teacher training" brought a small upsurge in research in this field. The concept of "Smart teacher training" can help teachers solve the contradiction between engineering and study, realize lifelong learning, and conform to the development and requirements of the times.
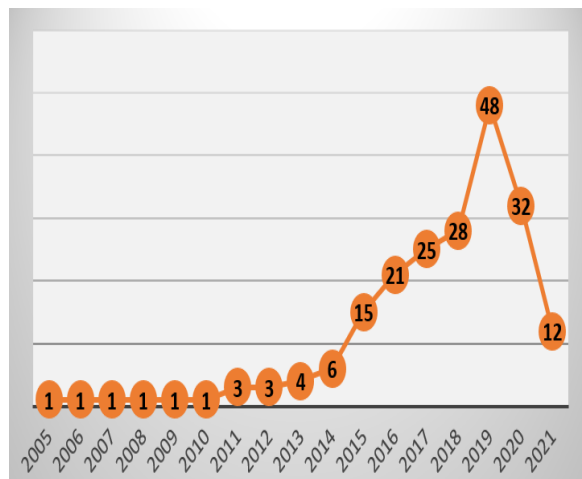

Figure 1 Trend in the number of articles issued

It can be seen from the meandering curve in the figure that the path of teachers' growth in the smart education environment is not smooth. Researchers and teachers are moving forward in constant exploration, but they have never stopped the pace of wisdom education.

3.2 Distribution of research institutions

Set "institution" as the node type in CiteSpace, and obtain the cooperation network and node graph of research institutions in the field of teacher professional development under smart education from 2004 to 2021. The study found that the main force in domestic research in this field comes from major universities, mainly represented by Beijing Normal University, Jiangsu Normal University, East China Normal University, Nanjing Normal University, etc. The cooperation network analysis was carried out on the institutions that issued the documents, and it was found that the node density of each institution was close to 0, indicating that the connection density between different institutions is very low, and major universities are conducting independent research, and a cohesive inter-school scientific research has not yet been formed. group.

4 HOTSPOTS AND FRONTIERS

4.1 Research hotspot analysis

Figure 2 is a cluster map of the research field of teacher professional development under smart education. The size of the cluster number is inversely proportional to the number of keywords contained in the cluster, and each cluster is composed of multiple related keywords. Combined with the analysis of literature content, this study divides each cluster into the following three parts according to Figure 2.
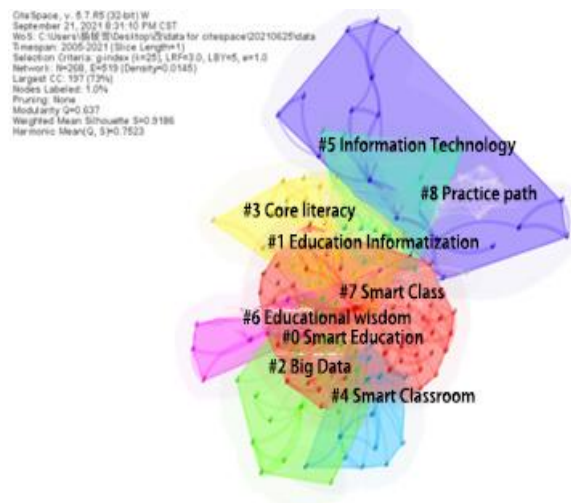

Figure 2 Clustering map of teacher professional development research areas under smart education

4.1.1 Research on the connotation of wisdom education

Smart education is leading the development direction of national education informatization and has become the main theme of education development in the era of technological change education [3]. The smart education system includes a smart learning environment, a new teaching model, and a modern education system [4]. Therefore, the clusters of "#1 Education Informatization" and "#0 Smart Education" are summarized as the connotation exploration of wisdom education. It can be seen from this that smart education is to use emerging technologies to build a smart learning environment, so that teachers can teach in smart classrooms, and pay attention to the changes in the teaching environment and the growth of teachers so that they can better cultivate innovative talents.

4.1.2 Research on the characteristics of smart classroom

Emerging technologies such as big data, cloud computing, Internet of Things, and artificial intelligence have changed the classroom teaching environment. New teaching models and teaching environments supported by

technology have contributed to the birth and development of smart classrooms. Therefore, the clusters of "#5 Information Technology", "#4 Smart Classroom" and "#2 Big Data" are summarized as the characteristic exploration of a smart classroom. It can be seen that the integrated development of information technology and education and teaching is an important symbol of the development of smart classrooms [5]. Based on the rapid development of various information technologies, various data that were difficult to collect in the past can be obtained in educational practice [6]. Big data empowers smart classrooms and provides a new fulcrum for smart education. Therefore, only by grasping the essence and characteristics of smart classrooms can teachers better realize smart teaching.

4.1.3 Inquiry into Teachers' Competence

Teacher professional development refers to the process that teachers continuously learn professional knowledge, increase teaching skills, pay attention to students and continuously improve professional quality in education and teaching practice [7]. Therefore, the "#8 practice path", "#6 educational wisdom" and "#3 core literacy" are clustered as an exploration of the abilities that teachers should have in smart classrooms. Today, with the gradual popularization of smart classrooms, the focus is on how to help teachers implement smart classroom teaching around the core literacy of students. The traditional classroom requires teachers to have the ability to mainly focus on language expression, writing on the blackboard, teaching design, etc. However, these abilities are far from meeting the needs of the smart classroom. As my country's educational information enters the stage of smart education, teachers are required to have the ability to in-depth integrate innovative information technology and teaching. Smarter teaching based on artificial intelligence connects the classroom with modern technology, which is what smarter education should be.

In the era of smart education, teachers promote the rational transformation of educational tools, promote the return of educational value rationality, and realize the rational integration of educational tools and educational values, which fully demonstrates the significance and value of teachers' existence. The continuous development of science and technology has brought more possibilities to education, which has greatly facilitated teachers, but it has also put forward higher requirements for teachers' abilities, that is, teachers must have educational thinking, design thinking, computational thinking, and data thinking. And organically integrate it into the educational goals, teaching content, teaching process, and learning evaluation, and enhance the ability of intelligent and creative teaching, in order to cope with the changes brought by artificial intelligence to education. The professional development forms and paths of teachers in

the new era must keep pace with the times and learn with skills. In the era of smart education, teachers and teaching and research personnel must constantly review the new form of education, constantly explore the path suitable for teachers' growth, and realize the professional development of smart teachers.

4.2 Research Frontier Analysis

This paper selects the time zone view in CiteSpace to sort out the research hotspots of teachers' professional development from the perspective of smart education from 2005 to 2021. Projecting the high-frequency keywords of teachers' professional development from the perspective of smart education into the map with time as the horizontal axis can identify the evolutionary trend of this field, as shown in Figure 3. It can be seen from Figure 3 that the professional development of teachers from the perspective of domestic smart education can be roughly divided into three stages.
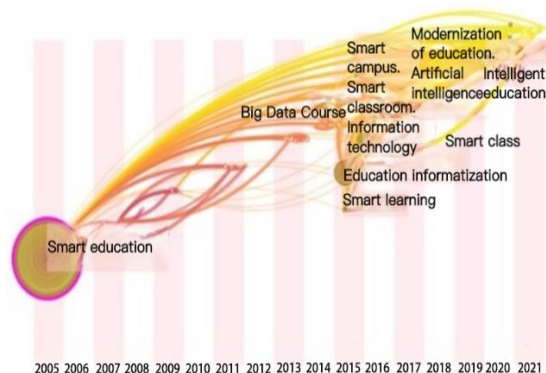

Figure 3 Time zone map of teacher professional development research in the context of smart education

(1) The first stage (2005-2015): the embryonic stage of teacher professional development research from the perspective of smart education. In 2005, the concept of "wisdom education" was first proposed; in 2007, some scholars pointed out that research on educational wisdom should be carried out, and there is a collinear connection with other keywords in the future. After the keyword "education informatization" appeared in 2015, keywords about the professional development of teachers under smart education began to focus, and keywords such as smart courses, smart campuses, information technology, and smart learning began to emerge in large numbers.

(2) The second stage (2016-2018): the exploration stage of teacher professional development research from the perspective of smart education. After 2016, with the emergence of keywords such as smart classrooms, smart classrooms, and artificial intelligence, educational researchers have begun research on the application of artificial intelligence in all aspects of education. For example, artificial intelligence + teacher teaching and research, making the network teaching and research and training have been fully popularized and applied,

bringing a new style to the teaching, research, and training work [8].

(3) The third stage (2018-present): The research on teachers' professional development from the perspective of smart education gradually moves towards the research on teachers' personalized learning. Smart education is the practical path of education informatization 2.0 action, and smart education is the beacon of education informatization 2.0 action [9]. The ultimate goal of intelligent education, intelligent education, and education informatization is to realize the modernization of education, and the key to realizing the modernization of education is education informatization. Professional growth has important formal significance.

5 CONCLUSION

This paper uses CiteSpace5.6 software to analyze 203 papers on the research of teachers' professional development from the perspective of smart education in CNKI core journals from 2005 to 2021. Scholars have conducted research on teachers' professional development from different perspectives and fields. Finally, the author draws corresponding conclusions from three aspects: research overall, research content, research hotspot, and frontier.

5.1 From the research as a whole

The smart teaching environment represented by the smart classroom has been popularized, but for many teachers, how to integrate technology with teaching content and use technology to change traditional teaching and learning is still difficult [10]. Most of the research on teachers' professional development under smart education is in colleges and universities, but there are few connections between major colleges and universities, and there is no research group with relatively large connections.

5.2 From the research content

In the era of smarter education, in terms of the characteristics and construction of smarter classrooms, scholars can enumerate the features and functions of smarter classrooms, but there is no effective solution to the problems existing in the process of smarter classroom teaching. achieve the desired effect. In the exploration and analysis of teachers' growth paths, influenced by traditional teaching and research methods, more group teaching and research are carried out, while teachers' personalized learning needs are ignored. In terms of teachers' ability to explore: pay more attention to the training of teachers' skills. However, teachers' informatization teaching skills are the basis for the development of smart education, but teachers' informatization teaching skills are not only limited to technology, but also have smart classroom teaching

design and research capabilities, smart classroom feedback capabilities, and multimodal education. data analysis capabilities, etc. Therefore, it is necessary to clarify what abilities teachers should have in the era of smart education, and then formulate corresponding personalized training programs to help the growth of smart teachers.

5.3 From research hotspots and trends

Educational informatization is the focus and hotspot of education all over the world in the 21st century. The infrastructure construction of smart education in schools has achieved good results, and a new ecology of the smart environment has been initially established. However, in order for educational informatization to truly empower school education, to closely combine school informatization resources with smart teaching, and to make the school's smart education environment truly play a role, the core lies in smart teachers.

6 THINKING

6.1 Identify the abilities that smart teachers should have

With the advent of the information age and the continuous impact of emerging technologies, smart classrooms with deep integration of information technology and education have become an inevitable trend. However, navigating the smart classroom is not easy for teachers. The current teaching environment supported by information technology has significantly stronger interactive functions than traditional teaching. However, the control of the teaching process, the use of software, the analysis of big data, etc., are tests and challenges for many teachers. Therefore, in order to ensure the smooth progress of educational activities in smart classrooms, teachers must have profound knowledge and high professional quality, and always insist on learning in their teaching careers, so as to continuously inject new blood into their development. "Study rigorously, keep pace with the times, live to old age, learn to old age" is the lifelong learning concept that teachers should have in the era of smart education. Lifelong learning can not only update teachers' knowledge, but also improve teachers' various teaching abilities, so that teachers can adapt to changes in smart classrooms. The rapid development of science and technology has also brought about continuous changes and development in the educational environment. Only by responding to the ever-changing teaching environment with the concept of lifelong learning is the foundation of a teacher's life. Therefore, it is necessary to clarify that teachers should have Which abilities can better realize wisdom education and cultivate talents with all-around development.

The role of teachers in the era of artificial intelligence should seek to change while the core elements remain unchanged, from "solving doubts" to "seeking doubts", from "teaching careers" to "establishing careers", and from "preaching" to "exploring the path" [11]. Smart teachers are not only classroom lecturers and organizers, but also have multiple roles: lifelong learners who deal with challenges, psychologists who enrich students' spiritual world, designers, practitioners, researchers, etc. of smart classrooms.

6.2 Build a smart learning space to help the personalized growth of smart teachers.

The use of artificial intelligence, Internet +, big data and other technologies to build a smart learning space not only allows teachers to keep pace with the times, dare to accept and apply emerging technologies, but also stimulate teachers' interest in learning, and cooperate with teachers from different regions, different majors, different generation. Teachers communicate and learn from each other, so that teaching and research collide with more intense sparks, as shown in Figure 4. Teachers participate in online, offline, online, and offline collaborative teaching and research activities in a community manner, obtain data in learning spaces such as audio, video, and discussion, and use clustering, collaborative filtering recommendations and other methods to analyze the data. Clustering classifies lecturers with the same characteristics into one group, and implements different teaching strategies for different types of teachers, so as to realize the personalized development of teachers.
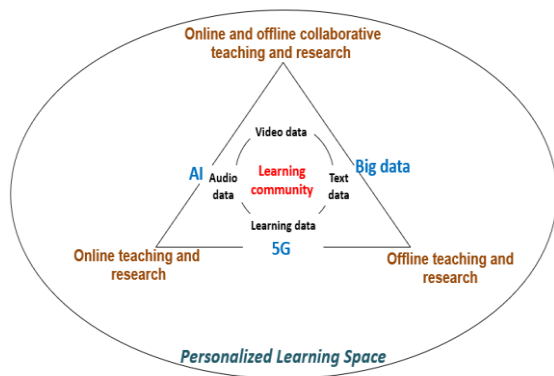

Figure 4 Composition of teachers' personalized learning space

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