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Research on the Construction of Personalized Classroom Teaching Mode Using Artificial Intelligence Method

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Abstract: *On the background of analyzing the current integration and implementation status of "artificial intelligence+teaching", this paper proposes the idea of constructing a personalized classroom teaching mode with interpretable artificial intelligence. In response to the research question, we design an overall framework for personalized classroom teaching using interpretable "artificial intelligence+teaching", which includes three parts: interpretable artificial intelligence clustering method, student-interest based classroom teaching mode, and interpretable artificial intelligence classroom teaching evaluation system. The interpretable artificial intelligence clustering method integrates artificial intelligence technology to group students according to interest tags. Based on this, teachers conduct group classroom teaching and organize students for discussions. The evaluation system for artificial intelligence classroom teaching can be explained by evaluating teaching modes through methods such as model design and construction, classroom teaching implementation, and post class evaluation to ensure teaching quality and effectiveness.*

Keywords: *interpretable, artificial intelligence, personalized, classroom teaching*

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I. INTRODUCTION

Designing personalized teaching content or discussion topics for students based on their interests and needs is an important means of achieving personalized classroom teaching. Personalized teaching can fully tap into students' independent innovation ability and logical thinking ability. How to tap into students' interests, integrate their interests and innovation consciousness with industry needs and socio-economic development needs, and guide students to master the skills required by the industry is the key to personalized classroom teaching. In the new era of educational informatization and intelligent teaching, utilizing artificial intelligence technology to achieve intelligent teaching, improve teaching quality and efficiency, and guide teachers and students to fully integrate into the new stage of intelligent teaching is a necessary requirement for the deep integration of "artificial intelligence+education". The essence of "artificial intelligence+education" is to achieve a deep integration of artificial intelligence technology with teaching methods and models, and to use artificial intelligence technology to solve the problems of low efficiency, low accuracy, and difficulty in achieving personalization in traditional education and teaching. Essentially, the most important core essence of "artificial intelligence+education" is to achieve the integration, application, and process development of artificial intelligence technology and education. However, there are currently insurmountable practical problems in the integration of "artificial intelligence+education", among which the most representative problem is how to interpret the interpretability of artificial intelligence, enhance the understanding, acceptance, and use of "artificial intelligence+education" by teachers and students, and ensure the effective integration of artificial intelligence with education and teaching.

Artificial intelligence itself is an interdisciplinary field based on computer science and integrated with disciplines such as mathematics, philosophy, and psychology. One of the characteristics of artificial intelligence is its complex methods and logic, especially for people without computer and mathematical foundations, complex artificial intelligence algorithms are difficult to understand. Without understanding artificial intelligence algorithms, users are prone to develop feelings of distrust and rejection, making it difficult to use artificial intelligence tools effectively. For classroom teaching, non-computer major teachers and students have a low acceptance of artificial intelligence. Even if AI methods can be developed to assist teaching, it is difficult for teachers and students to correctly understand the basic logic and principles of AI assisted teaching, which affects the effectiveness of classroom teaching and the popularization of AI methods. Therefore, researching interpretable artificial intelligence methods and transforming complex artificial intelligence principles into methods that both teachers and students can understand and accept is an important way to deeply integrate artificial intelligence technology with classroom teaching. In response to this issue, we study the basic logic of

implementing artificial intelligence in classroom teaching, design the specific processes for using key methods of artificial intelligence in classroom teaching, and provide the reference for "artificial intelligence+teaching".

II. THE DESIGN OF THE OVERALL FRAMEWORK

In response to the research question, we design an overall framework for personalized classroom teaching using interpretable "artificial intelligence+teaching", which includes three parts: interpretable artificial intelligence clustering method, student-interest based classroom teaching mode, and interpretable artificial intelligence classroom teaching evaluation system. Figure 1 shows the established overall framework.

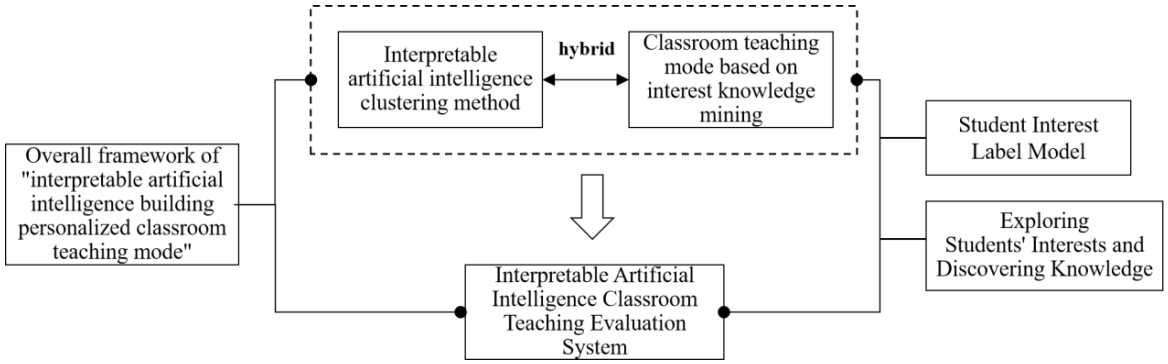

Figure 1. The established overall framework

In the overall framework, interpretable artificial intelligence clustering methods are the key methods that embody artificial intelligence technology, with the main goal of achieving grouping of students in a class. In the teaching process of universities, some courses require students to conduct group discussions or report research results in groups. Generally speaking, class grouping is based on the teacher's teaching experience or students' independent grouping. However, this method is not scientific, lacks strict quantitative basis, and is highly arbitrary. Using artificial intelligence methods to quantify and mine student interest tags, obtaining student grouping criteria, can scientifically and reasonably achieve student grouping, and efficiently complete discussions and research.

The classroom teaching model based on student interests is established on the basis of scientific and reasonable student grouping. Teachers determine different discussion topics based on student grouping and publish them to each group. Students report in groups after thorough research, discussion, and summarization. This approach ensures that the content of each group's research and report is in line with students' interests, and matches the teaching content and theme, achieving personalized teaching.

The establishment of an interpretable AI classroom teaching evaluation system is to evaluate and control the quality of the application of AI methods in the entire process of classroom teaching, ensure the reasonable use of AI methods, ensure that classroom teaching can produce good results, and improve the satisfaction of teachers and students.

III. INTERPRETABLE ARTIFICIAL INTELLIGENCE CLUSTERING METHOD

Clustering method is a method of artificial intelligence that enables objects to cluster together. Teachers should first study the teaching content, such as the theme of the seminar "Rural Tourism". Based on the seminar theme, teachers need to further determine the seminar content of this theme, such as "Rural Health Care", "Rural Study", "Rural Cuisine", etc. For these seminar topics, teachers should design labels that describe the seminar topics for students to choose and grade. By establishing student interest tags and quantifying their interests, it is possible to describe their level of preference for a certain topic, thereby mining their interests. On the basis of determining students' interest tags, design clustering methods to group students. There are many clustering methods, such as AGNES method, DIANA method, k-means method, etc., each with its own characteristics. For quantitative methods that use interest labels as discrete data, using spatial distance to measure the closeness between student labels is an important method for establishing clustering objective functions.

Teachers can use learning platforms such as Chaoxing Learning Platform to establish student interest tags, design interest tag attributes, quantify interest tags, and generate structured data for constructing clustering methods. The constructed labels meet the following requirements: firstly, they match the classroom teaching content and theme, and comply with the requirements of the teaching plan and syllabus. The second is to present interpretable label content and forms to teachers and students, which can enable them to quickly understand and

accept, in line with their cognition. Use visual and easy to understand language to express problems when designing labels and score ranges. The third is that the constructed interest tags have clear differentiation, covering course attributes and all student interests, which facilitates data collection.

Establish closeness between pairwise labels using Euclidean distance. Euclidean distance is equivalent to the distance between points represented by vectors in high-dimensional space, establishing spatial relationships between interest indicators and obtaining the closeness between student interest vectors. Students with high closeness are clustered together, while students with low closeness are assigned to different clusters. The construction process of the model is entirely completed in visual tools such as Excel and SPSS. Teachers and students are fully involved in the design of clustering methods, data collection, and modeling processes. The interpretability of clustering methods is strong and easy for teachers and students to understand. On the basis of establishing clustering methods, explore students' interests and group them. This process is the goal of interest mining. Teachers analyze mining results, interest knowledge, and class grouping to obtain students' interest tendencies, and then design teaching themes or discussion topics for each group of students based on teaching plans and content. The student groups output through clustering methods have obvious characteristics of interest groups, and each group is relatively independent in terms of interest tendencies. Figure 2 shows the process of constructing an interpretable artificial intelligence clustering method.

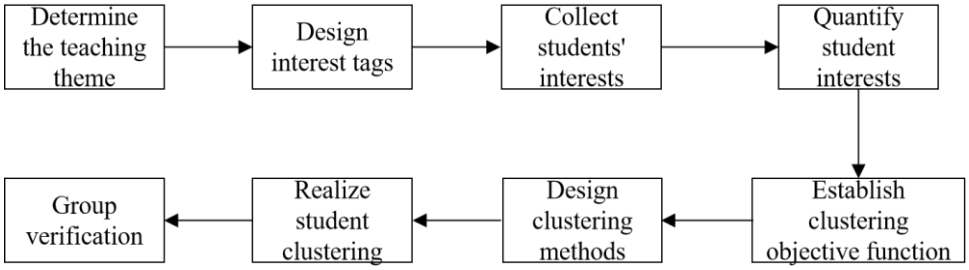

Figure 2. The process of constructing an interpretable artificial intelligence clustering method

IV. CLASSROOM TEACHING MODE BASED ON INTEREST KNOWLEDGE MINING

After using clustering methods to group students' interests, teachers design corresponding teaching content or discussion topics based on the grouping situation. On the basis of designing grouping themes, construct a classroom teaching model based on student interest grouping. Taking the discussion classroom teaching of professional practice courses as an example, design interactive discussion content for different interest groups based on the same discussion topic. The teacher guides the students to explore and research the problems, and provides solutions or decision-making plans. Examples of design cases with the same research topic include:

① How college students can realize their own value
② Case Study on Scenic Area Service and Management
③ Appreciation and exploration of literary poetry and artistic conception
④ Design and Optimization of Tea Art Process
⑤ How to improve the comprehensive quality of research study instructors

On the basis of designing classroom discussion topics, teachers can further design targeted discussion topics according to the interests and tendencies of each group, or each group member can independently design discussion topics based on their interests and hobbies, and determine the final report content or problem solutions through in-depth conversations, brainstorming, group listing, six sided thinking, etc. After the discussion in each group is completed, the teacher organizes each group to report the results of the discussion, and the whole class evaluates the strengths and weaknesses. Through group discussions based on different interests, fully mobilize students' enthusiasm, achieve personalized teaching goals by teaching according to their aptitude and promoting diversity among different schools of thought.

V. INTERPRETABLE ARTIFICIAL INTELLIGENCE CLASSROOM TEACHING EVALUATION SYSTEM

The quality evaluation system of Interpretable"artificial intelligence+teaching" is very different from the quality evaluation system of traditional classroom teaching, mainly including the following core evaluation indicators:

Firstly, the evaluation indicators for the overall framework of "interpretable artificial intelligence construction personalized classroom teaching mode" run through the entire process of course design, model construction, classroom teaching implementation, and post class reflection and summary. In the process of

model design, teachers need to consider quality monitoring, and the main methods of design need to strictly follow the teaching content and plan, while also taking into account students' cognitive patterns. The selection of models should also consider the acceptance level of teachers and students. Difficult and logically complex models should not be chosen, and methods that are easy for teachers and students to understand should be chosen. The implementation of classroom teaching and post class reflection should also strictly follow a reasonable process of steps. When completing each content, the results should be verified, reflected on, and summarized to find out if there are any problems. If there are problems, the root cause of the problem should be identified and solved in a timely manner to ensure the correctness and rigor of the teaching process and ensure the quality of classroom teaching.

Secondly, in the process of constructing clustering methods, it is necessary to establish standards for designing and collecting interest tags, quality control standards for interest vectors, and evaluation indicators and methods for clustering methods, in order to track and evaluate the entire clustering process. Clustering method is the key to generating student interest groups. Teachers need to establish evaluation indicators and methods specifically for clustering methods, and conduct quality control on the design, implementation, and verification of clustering results.

The third is to evaluate the quality of classroom teaching, including quality control of teaching content, monitoring of theme matching in group discussions, standardized processes for group discussions, group reporting, and class evaluation standards and processes. Classroom teaching implementation is the verification of grouping results. While organizing teaching practice, teachers need to summarize and analyze teaching content, classroom teaching situation, student feedback, discussion results, etc., and obtain corresponding conclusions. For the problems discovered, teachers should promptly trace their roots, find the crux of the problem, and adopt reasonable measures to solve the problem, in order to improve the quality and effectiveness of classroom teaching.

VI. CONCLUSION

In the context of analyzing the current integration and implementation status of "artificial intelligence+teaching", this paper proposes the idea of constructing a personalized classroom teaching model using interpretable artificial intelligence. In response to the research question, we have designed an overall framework for personalized classroom teaching using interpretable "artificial intelligence+teaching", which includes three parts: interpretable artificial intelligence clustering method, student interest based classroom teaching mode, and interpretable artificial intelligence classroom teaching evaluation system. In the design of interpretable artificial intelligence clustering methods, teachers should use methods that are easy for students to understand to design models, simplify and visualize complex algorithm processes. By designing tags that are easy for students to understand to capture their interests, student grouping can be achieved. In the implementation process of classroom teaching based on students' interests, teachers design different seminars and teaching themes according to students' grouping and interests, in order to stimulate students' interests and achieve personalized teaching. In the construction of the classroom teaching quality evaluation system, teachers should monitor the integration of interpretable artificial intelligence methods into teaching practice from the aspects of overall design evaluation, model method design evaluation, and classroom teaching implementation evaluation to ensure teaching quality and effectiveness.

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