Using Artificial Intelligence to Promote Student-Teacher Interaction Research in and out of Class

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Abstract

Teaching is an interactive process in which students and teachers actively participate. Teachers and students interact, communicate, influence and complement each other, which is the essence of teaching. The classroom atmosphere and the relationship between teachers and students largely determine the degree of students' participation. Learning is not only the transfer and transmission of knowledge from outside to inside, but also the process of learners actively constructing their own knowledge and experience, and students are not passive information absorbers. The intelligent classroom constructed by artificial intelligence plays an important role in cultivating the comprehensive quality of primary school students. Based on the construction of excellent courses of artificial intelligence technology and application, this paper puts forward a mixed teaching strategy based on multi-dimensional in and out of class interactive teaching method, so as to improve teaching effect and enhance students' learning enthusiasm.

Keywords: Artificial intelligence, In and out of class, Teacher-student interaction

Ⅰ. Introduction

Interactive teaching between teachers and students in and out of class is a teaching method of two-way communication between teachers and students, which regards teaching activities as a sincere and harmonious communication between teachers and students, and regards teaching process as a dynamic and developing activity process of teaching and learning unification. It is a new subject philosophy that dispels the opposition between subject and object and the center of subject. Intersubjectivity refers to the relationship of equal communication, two-way interaction, active dialogue, mutual understanding and integration between subjects in language and behavior, which means that different subjects reach consensus and show harmony centered on "interactive subjects" in communication. It breaks the isolated state of subjects and constructs the interactive relationship among multiple subjects.

Artificial intelligence is a computer system with human knowledge and behavior, and the ability to learn, infer and judge to solve problems, memorize knowledge and understand human natural language [2-3]. It is a comprehensive cross-discipline, a frontier discipline developed from computer science, cybernetics, information theory, neurophysiology, linguistics and other disciplines. It will become an important scientific and technological foundation for human society to move towards a smart society. By optimizing the way of "teaching interaction", that is, by adjusting the relationship between teachers and students and their interaction, harmonious interaction between teachers and students, interaction between learning individuals and teaching agents can be formed, and the interaction between people and social environment can be strengthened [4]. Artificial intelligence has been well applied in the field of education, and it plays an important role in the interactive teaching process between teachers and students in and out of class. Smart classroom has developed into an effective way to build an efficient teaching atmosphere, which is conducive to the formation of a good teacher-student relationship.

Ⅱ. The Role of Artificial Intelligence Technology in Education

In recent years, personalized teaching methods such as MOOC class, micro class, flip class and split class have innovated the interactive cognitive process of teaching. However, these methods make the teaching process

reconstructed by multimedia and the teaching content fragmented, which makes it difficult to optimize and concentrate the use of educational resources. Artificial intelligence technology can also break the limitation of space and time. People can enjoy the long-distance physical environment without leaving home, and quickly get a lot of changes that need a long time to observe.

There have been many achievements in using artificial intelligence technology to assist classroom teaching in the world. For example, based on adaptive technology, personalized intelligent teaching system is recommended according to students' learning interests [5], learning system based on reasoning model to infer students' personality characteristics [6], intelligent teaching system based on cognitive and metacognitive sequences to explore tacit knowledge mastery [7], and mobile learning peer system based on perceptual data to realize adaptive learning, etc.

Chinese scholars have also carried out many fruitful researches on classroom teaching analysis based on artificial intelligence, such as the visual analysis method of educational big data based on map, and the intelligent identification system of classroom teaching video, etc. [9]. It can be seen that classroom teaching analysis has opened the exploration road of integrating artificial intelligence.

At present, artificial intelligence technology has entered the third development wave, but generally speaking, it is still in the stage of weak artificial intelligence. Moreover, the existing theories and methods of classroom teaching analysis also need time to transform and improve, so as to give full play to the role of artificial intelligence technology. The evolutionary path of classroom teaching analysis based on artificial intelligence collaboration is shown in Figure 1.
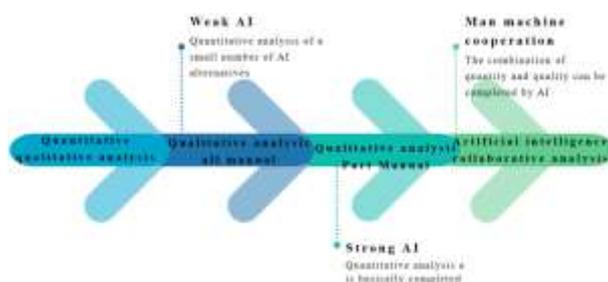
Fig.1 Evolutionary Path of Classroom Teaching Analysis Based on Artificial Intelligence Collaboration

With the development of artificial intelligence technology, high-quality intelligent evaluation system has become one of the important topics in the field of computer-aided instruction. The expert module of intelligent teaching system is introduced into the process of students' test and evaluation, and the computer intelligent system of teaching activities is evaluated by using a large amount of expertise possessed by the expert module. Usually, after the attribute values of each index for evaluating the teaching quality are input into an appropriate calculation model, the output obtained will be used as the evaluation result.

Ⅲ. Importance of Teacher-Student Interaction in and out of Class

A. The Inevitable Way to Overcome Students' Silence in Class

Classroom is a place where teachers and students work together. The teaching process is essentially a process of information interaction between teachers and students. The real classroom is not a one-man show by teachers. However, in recent years, the phenomenon of students' classroom silence is spreading from senior to junior, and permeating from public courses to specialized courses. To a great extent, students' learning effect depends on their initiative and participation in classroom learning. However, the teaching process should be a process of teacher-student dialogue, but it is simplified as a process of knowledge transfer; The inequality of discourse power also greatly suppresses the exertion of students' personality, and it is difficult for students to develop their interest in exploring knowledge and realize their passion and happiness in exploring knowledge, so classroom silence is inevitable.

B. It Can Effectively Stimulate Students' Interest in Learning

In order to produce teacher-student interaction in class, it is necessary to pay attention to students in class with the goal of acquiring new knowledge and generating new experiences, and pay attention to students' cognitive needs, emotional needs and behavioral needs. Only by winning students' trust with profound professional knowledge, extensive cultural knowledge and interest, making friends with students and creating a vivid and harmonious classroom atmosphere can teachers stimulate students' interest in learning and enable students to actively participate in teaching activities.

C. It Can Promote the Successful Completion of Teaching Tasks

Classroom interaction not only provides a good external environment for students to learn knowledge, but also enables students to learn cooperative learning and competition, equality and respect. Only by realizing truly effective classroom interaction and promoting the dynamic generation of classroom teaching can we promote both teaching and learning, and realize various teaching values effectively and comprehensively. However, only when interaction is established and reflects its dominant position in the classroom, can the classroom really glow with vitality and the teaching task be successfully completed.

D. It is an Important Link in Evaluating Teachers' Teaching Ability

It is the teacher's ability to design and control the classroom environment, and the main content is classroom interaction. Classroom environment is an important ecological environment. Its design and construction come from two subjects: teaching and learning, and teachers are the key subjects. Successful in and out of class interaction between teachers and students all sparkles with teachers' wisdom and creativity. The stronger the teacher's ability to control and control classroom interaction, the more students can change from passive thinking to active thinking, the more energetic the classroom is, and the better the teaching effect is. At the same time, in and out of class interaction between teachers and students is also a test and test of the new relationship between teachers and students, which can promote teachers to be strict with themselves and teach and educate people.

IV. Teacher-Student Interaction Design of in and out of Class from the Perspective of Artificial Intelligence

A. Constructing a Two-Way Management System for Teachers and Students in Classroom Teaching

Based on artificial intelligence, the architecture design of classroom teaching bidirectional management system is shown in Figure 2.
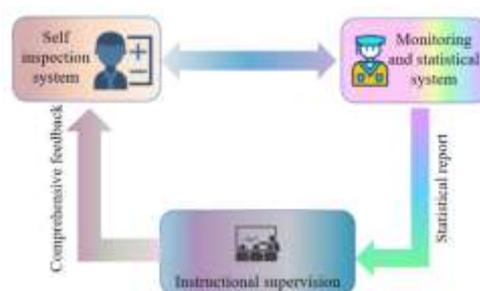
Fig.1 Two-Way Management System Architecture of Classroom Teaching Based on Artificial Intelligence

Composition of teachers, students and teaching supervision; The difference is that the data of students' classroom behavior monitored by teaching supervisors through artificial intelligence methods are statistically analyzed to form quantitative evaluation reports, which are fed back to teachers; Teachers' self-examination system can help teachers reflect on the teaching process and standardize teaching behavior; Students' monitoring and statistical system is mainly used to identify students' classroom behaviors and collect and sort out students' classroom behavior data. Specifically:

(1) Student module

The system mainly uses face recognition and image recognition technology to judge whether students are listening carefully and making abnormal behaviors unrelated to the classroom, and counts the time, time and number of behaviors. Students can only get their own data.

(2) Teacher module

Teachers' self-examination system can include functions such as speech recognition and analysis, behavior monitoring, etc. It can monitor teachers' emotional trend, investment degree, standardization of teaching language, etc. Teachers should reflect on the design of classroom teaching methods and teaching contents in combination with their own data monitored by the self-inspection system, data fed back by teaching supervisors and on-site feedback given by students in class. The data about teachers' self-examination system can only be seen by themselves.

(3) Teaching supervision module

Teaching supervisors will make statistical analysis according to the systematic monitoring and statistics of students' behavior data in class, form a quantitative analysis report, measure the quality of classroom teaching, and combine their own teaching experience to provide teachers with improvement suggestions, and convey the comprehensive evaluation results and improvement suggestions to teachers. Teaching supervisors can only obtain students' monitoring and statistical data.

(4) Value of data collected by system

Teaching supervision is based on statistical reports and gives reasonable teaching suggestions based on their own experience, which can effectively assist teachers to improve their teaching ability; In addition, the data collected under this system can be used for data analysis, and the interaction between people's behavior habits and teachers and students in the special classroom situation can not be achieved by the traditional classroom teaching management system.

B. Classification of Teaching Events and Sequence Analysis of Teaching Structure

Only when teaching activities coincide with learners' internal psychological process can they promote the occurrence of cognition. Evaluate the elements and relationships of instructional design schemes or instructional video recording texts. The evaluation of elements mainly examines the scientificity of the principles on which the elements of instructional design are based and the accuracy of narrative; Relationship evaluation mainly examines the structural sequence of teaching events and the relationship between events.

The research project carried out by our team is to use natural language understanding technology to evaluate relationships, analyze teaching events and sequences, and learn and partially replace traditional manual coding to assist human experts in classroom teaching analysis. The specific steps are shown in Figure 3:

Fig.1 Classroom Teaching Analysis Steps

Step 1: Label division and text annotation of teaching events. To extract the teaching events from the text and classify the events, it is necessary to understand the teaching events manually, including dividing labels and text labeling. In the stage of labeling, we mainly analyze the characteristics of each teaching event, label one sentence or

several sentences, and indicate which teaching event belongs to. In the text annotation stage, the partition labels are labeled, and the labeled data will be used for classifier training.

Step 2: Event classifier based on cyclic neural network. In this team, Word2vec, a deep learning model, is used to train the weight matrix of word vector, which is input into the Embedding layer of cyclic neural network for model training. each layer of network uses the average hidden state, outputs the classification results, and finally judges whether the model training is successful through the correct rate of training set and test set. According to the results of event classification, combined with dividing the starting and ending time points of events, the teaching event type and time distribution diagram of each lesson case are generated.

Step 3: Analyze the order of classroom teaching method structure. Teaching structure refers to the stable structural form of the process of teaching activities in a certain environment under the guidance of certain educational thoughts, teaching theories and learning theories, and is the concrete embodiment of the interaction and mutual connection among the four elements of the teaching system (teachers, students, teaching contents and teaching media).

This study is based on the teacher-led and student-centered dual-teaching structure [10], referring to the sequence classification of teaching structure, combining with the characteristics of primary school mathematics, the teaching events are classified into different stages, and the teaching method structure under the "leading-subject" teaching structure is analyzed. The corresponding table of teaching events and teaching stages is shown in Figure 4.


Fig.1 Correspondence between Teaching Events and Teaching Stages

According to the different proportion of teacher guidance in each stage, it is marked as high structured teaching, low structured teaching, low structured teaching with student activities as the main part and teacher guidance as the auxiliary part, and high and low structured teaching with student activities as the main part. Through the statistics of the results of high and low structural division, it can assist human experts to judge the implementation of the teaching structure of teacher-led and student-centered in the classroom.

C. Application Design of Educational Video Based on Artificial Intelligence

Interaction between Artificial Intelligence and Classroom The goal of Smart Classroom and Smart Campus is to use artificial intelligence, Internet of Things, big data, cloud computing and other technologies to realize the informationization and intelligence of classroom teaching and campus management, and to build a classroom teaching environment and campus environment supporting intelligent teaching activities and campus management. In the process of construction, intelligent video analysis will play an increasingly important role.

On the construction path of educational video application, we give the design framework of educational video application based on artificial intelligence, as shown in Figure 5. Among them, the basic layer constructs the hardware foundation and resource foundation of educational video application, and provides support from the aspects of computing power and data; The algorithm support of constructing educational video application in engine layer. On this basis, the educational video application is designed and implemented.
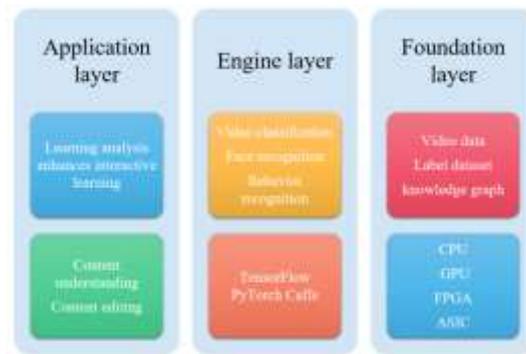
Fig.1 Design Framework of Educational Video Application Based on Artificial Intelligence

(1) Functional design

Multi-modal content understanding of video: Based on the support of video understanding function, multi-modal content analysis of video content, voice and image is realized, and video tags, video abstracts, text recognition and speech recognition are automatically generated.

(2) Carry out situational learning design

On this basis, combined with video text and tag content, we add situational learning resources to support enhanced interaction to realize situational learning support. The effective application of intelligent video analysis needs the support of big data, such as character tags and contextual resources in video understanding, which should be selected from data resource base on data training.

Through artificial intelligence, we can analyze, understand, describe and predict the contents of video scenes in intelligent classroom automatically in real time, carry out teaching detection and multi-modal learning analysis, enhance interactive learning scenes, and provide effective support for learning. In the construction of smart campus, intelligent video analysis is helpful to automatically identify the behavior of teachers and students, fully perceive the physical environment of campus, promote the evolution of digital campus to smart campus, build an intelligent teaching environment with technological empowerment and provide intelligent teaching services.

Ⅴ. Conclusion

High-quality and efficient classroom teaching is the fundamental guarantee to improve the quality of basic education and an important way to cultivate all-round high-quality talents. In the process of teaching, teachers and students exchange their emotions, concepts and ideas in order to seek new development, thus reaching consensus and realizing the true sense of teaching and learning, equal dialogue and cooperative construction. Therefore, the transformation of teachers' roles is very important. For teachers, interaction means not only spreading knowledge, but sharing happiness, understanding and development together. In this paper, combining with the teaching practice of artificial intelligence technology and application course, aiming at the teaching characteristics and discipline characteristics of the course, the multi-dimensional teaching method of teacher-student interaction in and out of class is adopted. Its goal is to make the problems of many knowledge points, many concepts and difficult reasoning calculation in traditional artificial intelligence teaching easy to learn, interesting and easy to understand. From the students' feedback, these methods have played a more obvious practical teaching effect and effectively improved the students' learning enthusiasm.

Ⅵ. Acknowledgment

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