Design and Practice of Blended Teaching in Smart Classroom Environment

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Abstract
Online and offline blended teaching is the mainstream teaching mode of current classroom teaching. The emergence and application of smart classroom has injected new vitality into blended teaching, which is more convenient for the implementation of blended learning Teaching and the collection and analysis of teaching data. Starting from the concept and model of smart classroom, this paper discusses the design and practice of online and offline blended teaching in the smart classroom environment from the perspectives of teaching mode design and teaching method innovation. The purpose is to help the teacher use smart classroom to improve classroom teaching quality more efficiently and improve students' learning autonomy and enthusiasm.

Keywords: *Smart Classroom; Blended Teaching; Instructional Design*

1 INTRODUCTION

With the vigorous development of information technology and the Internet, classroom teaching has also changed from pure offline teaching to online and offline blended teaching. Online and offline blended teaching combines the advantages of traditional offline teaching with the advantages of networked online teaching. Before class, students learn online video materials prerecorded or designated by the teacher to obtain preliminary knowledge and conduct online tests. In the class, according to the students' learning situation, the teacher and students conduct discussion learning on key or confused problems. After class, students finish the homework assigned by the teacher online. Through this teaching method, the teacher plays a leading role in guiding, enlightening and monitoring the teaching process, and fully reflect students' initiative, enthusiasm and creativity as the main body of the learning process, so as to maximize students' learning effect. Smart classroom is a new teaching environment derived from the development of educational informatization. It is a full-automatic system with rich technical equipment, data collection, learning analysis, evaluation and prediction, which provides more possibilities for the teacher' teaching and students' learning. Smart classroom has built an environmental foundation for modern online and offline hybrid learning. In this environment, how to design online and offline blended teaching mode to promote teaching, improve the actual effect of teaching and give full play to the systematicness and comprehensiveness of hybrid learning is an important issue to be discussed.

2 SMART CLASSROOM

2.1 *Smart classroom concept*

Smart classroom is a smart physical space and data space constructed by using the Internet, cloud computing, Internet of things, big data and intelligent technology. It is a new classroom with the functions of context perception and environmental management. It is the high-end form of multimedia and network classroom and the latest form of classroom information construction. Through the smart classroom, we can base on the needs

B. Fox et al. (Eds.): IC-ICAIE 2022, AHCS 9, pp. 7-12, 2023.
https://doi.org/10.2991/978-94-6463-040-4_3

of teaching activities, realize smart teaching management, provide intelligent application services, realize the effective integration of online and offline, optimize the presentation of teaching content, facilitate the acquisition of learning resources, promote classroom interaction, give full play to the main role of students, promote students' independent and personalized learning, and achieve the optimal teaching effect [1].

2.2 *Smart classroom model*

Huang Ronghuai and others [2] believe that the "smart" of smart classroom involves the optimized presentation of teaching content, convenient access to learning resources, in-depth interaction of classroom teaching, scene perception and detection, classroom layout and electrical management. It can be summarized into five dimensions: content showing, environment manageable, resources accessible, real-time interactive and situational testing The five dimensions of situational perception, which is abbreviated as "S.M.A.R.T". These five dimensions just reflect the characteristics of smart classroom, which can be called "SMART" conceptual model.

Nie Fenghua et al. [1] constructed the "iSmart" model of smart classroom from the perspective of system composition. In this model, the smart classroom is composed of six systems: infrastructure, network sensor, visual management, augmented reality, real-time recording and ubiquitous technology.

Two smart classroom models are shown in Figure 1.

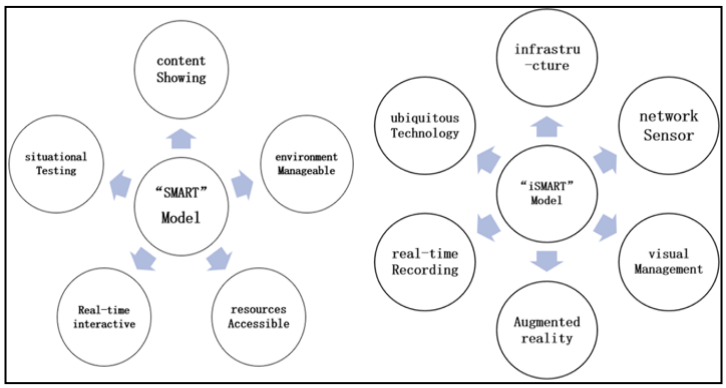

Figure 1. Two smart classroom models

3 THE DIFFERENCE BETWEEN SMART CLASSROOM AND MULTIMEDIA CLASSROOM

3.1 *Different equipment environment*

Multimedia classrooms are generally composed of computers, projectors, projection screens, central control systems, audio equipment and other common multimedia equipment. In addition to the projector, screen and audio equipment, other equipment is concentrated in the cabinet next to the classroom podium. All equipment is connected together through the integrated central control. Teachers can open the cabinet through the key or campus card and use multimedia equipment by operating the keys on the central control panel. The computer and central control system of the classroom are connected with the campus network, and semi intelligent management can be realized through the multimedia intelligent management system. The multimedia classroom is equipped with blackboard or whiteboard for class. The desks and chairs adopt fixed or non-fixed forms of ordinary layout. The capacity of the classroom is generally large and can accommodate 80-300 people.

Smart classroom mainly relies on emerging network information technologies such as cloud computing and Internet of things, and uses multimedia technologies such as wireless projection technology, multi-screen display technology, automatic recording and broadcasting technology, wireless sensor technology and radio frequency identification technology to realize intelligent teaching function and intelligent management function. Intelligent teaching function includes two subsystems: interactive teaching system and automatic recording and broadcasting system. The intelligent management function includes the intelligent management of personnel attendance, assets and equipment, lighting, doors and windows, air, video monitoring, etc. The main equipment includes smart classroom control terminal, digital audio processor, recording and broadcasting camera, large teaching screen, interactive intelligent tablet, teaching computer, surveillance camera, infrared transponder, positioning analyzer, etc. The smart classroom is equipped with main screen and multi-screen equipment for class. Tables and chairs are in non-fixed form, which can be combined freely, and the layout of the classroom is diversified and flexible; The classroom environment is spacious, comfortable and reasonable, but the capacity is usually small, which can generally accommodate 30-80 people.

3.2 *Different teaching methods*

Due to the setting of teaching environment, the teaching mode of multimedia classroom still continues to use the traditional indoctrination mode, and most of the students' learning methods are traditional and passive.

Flexible table and chair layout can be designed in the smart classroom, which can support various teaching modes such as ordinary lecture mode, group discussion mode and academic research mode. The teacher and students can have group discussion, group display and resource sharing. Using wireless projection technology and multi-screen display technology, the information of learners' mobile terminals can be displayed in time to facilitate sharing and communication, so as to truly realize the Student-centered Interactive teaching mode.

4 DESIGN OF BLENDED TEACHING IN SMART CLASSROOM ENVIRONMENT

Taking advantage of the characteristics that the intelligent classroom environment can easily obtain teaching resources and realize full interactive teaching, the three-stage teaching mode and multi round incentive teaching method are designed.

4.1 *Three stage teaching mode*

The implementation process of the three-stage teaching mode is shown in Figure 2.

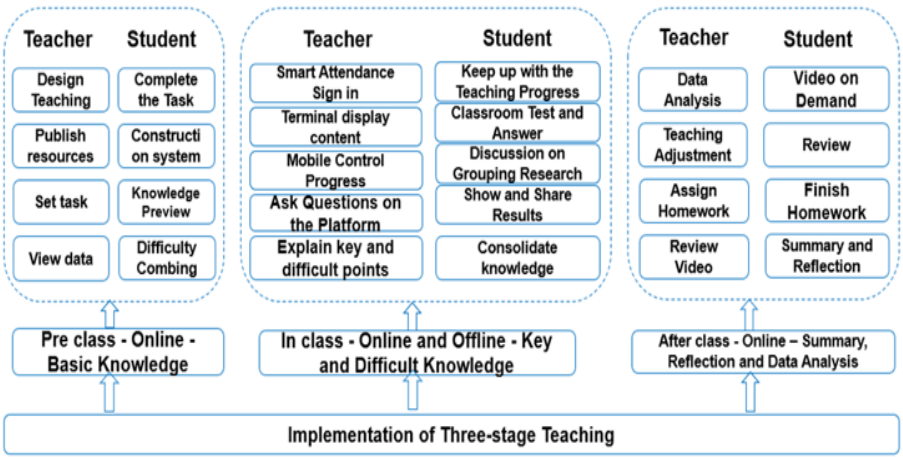

Figure 2. The implementation of three-stage teaching mode

1) Before class: The teacher prepares for teaching and students preview and learn basic knowledge by using the online platform. The teacher carries out teaching design and prepare teaching resources, and use task driven method to mobilize students' learning enthusiasm. The teacher design the corresponding task list according to the teaching content, and refine each knowledge point into one or more executable, easy to operate and specific tasks one by one, so that students can realize the construction of their own knowledge system in the process of completing the task. Relying on the online platform of smart classroom, the teacher release students' preview tasks according to the task list, such as videos that students need to watch, expanded materials to read, topics to discuss, completed tests, etc. According to the tasks, videos, notices and materials released by the teacher online, students independently complete the preview of basic knowledge content, sort out doubts and difficulties, and complete the preview test assigned by the teacher [3].

2) In class: The teacher uses online and offline integration to organize classroom teaching. In the process of teaching in the smart classroom, the teacher can synchronize the teaching content to the display terminals in different positions such as the main screen and side screen of the smart classroom, and students can watch the learning classroom content accurately and clearly in any corner of the classroom. In order to enrich the teaching contents, the teacher can display different teaching contents on different display terminals. The teacher can control the teaching content and teaching progress at any position in the classroom through the mobile terminal, and can ask questions and test at any time through the intelligent platform [4].

Firstly, the teacher uses the attendance system of smart classroom or the sign in function of smart platform to check in students, and then display the preview test results of students on multiple screens to explain the problems encountered by students. The designed pre-class test is released to test students' mastery of preview knowledge and problem explanation. For the problems that some students make mistakes, select 2-3 students to explain through the election mode of the smart platform. For the problems that most students make mistakes, students will discuss in groups and display the discussion results on different display terminals. The teacher and students complete the answers and doubts of questions through comparison and comment on the results and realize students' mutual learning and common progress at the same time.

Through the two tests, the teacher can understand the inquiry situation of students' learning and select the key and difficult points and the places where there are problems according to the teaching objectives and answers, so as to further help students master the knowledge points that they do not understand deeply and vaguely, and also help the mastered students consolidate and review the relevant contents. After explaining the key and difficult points of knowledge, the teacher will show the inquiry questions related to real life in the form of animation or video. Students are divided into groups for research and discussion, and present solutions to multiple screen terminals. Then the teacher comments on the results of the students' discussion, and the students also comment on each other to obtain the final solution, so as to exercise the students' ability to analyze and solve problems.

In the process of teaching, the teacher can use the intelligent platform to conduct classroom tests at any time and view the test results in time. Through the test data analysis results, the teacher can understand students' knowledge mastery and improve teaching progress and teaching behavior at any time.

3) After class: The teacher analyzes and summarizes the teaching data and adjusts the teaching strategies, and the students review and preview for the next class. The video of the complete teaching process recorded by the recording and broadcasting system in the smart classroom is automatically uploaded to the teaching on-demand platform. Students can independently review on-demand. The teacher can watch the video to find the highlights and deficiencies in teaching and see the students' reactions in class, so as to lay a foundation for adjusting teaching strategies. In addition, teachers can assign homework on the smart platform and check the completion of students.

4.2 *Integrate multiple teaching methods*

The integration and innovation form of various teaching methods is shown in Figure 3.

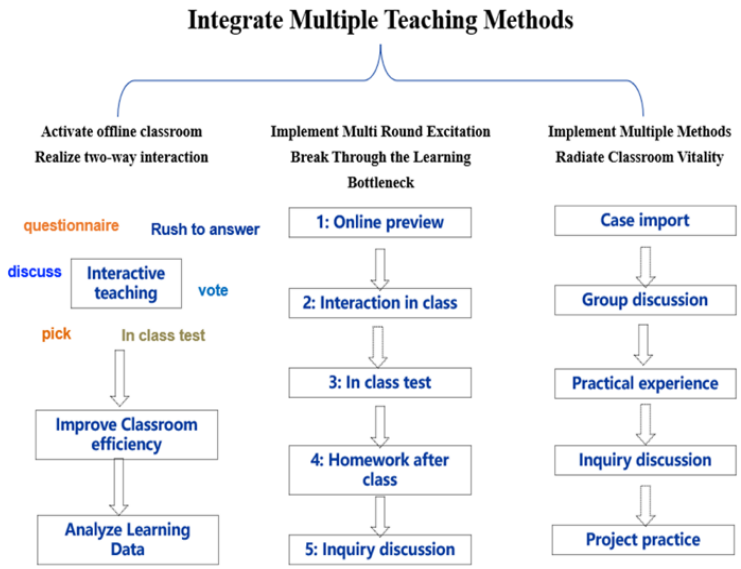

Figure 3. Integrate multiple teaching methods

The teacher makes full use of the activities such as "selecting", "answering", "voting", "Questionnaire", "discussion" and "in class test" of the intelligent platform or learning link to carry out two-way interactive teaching, activate the offline classroom and realize the two-way interaction between teachers and students. Through this method, the teacher turns the dull classroom into an active classroom and use online data to clearly show the students' mastery, so as to realize the requirements of "leaving traces in the learning process" and "analyzing learning data".

The teacher design the teaching process and implement multiple rounds of incentives to break through the bottleneck of students' learning. The first round of motivation is online preview, watching videos and completing tests to master basic knowledge. The second round of incentive is an offline classroom interactive activity. On the basis of online preview and test, combined with teachers' explanation and interactive discussion, students can master important and difficult knowledge, analyze practical problems and master practical application, so as to enhance their interest in learning. The third round of incentive is the online in class test, which completes the clearance test around key and difficult knowledge and practical problems according to the classroom development and online teaching resources. The fourth round of incentive is online homework, which is completed according to online resources and course playback. Through multiple rounds of incentives, students can break through the learning bottleneck. Teachers can master students' learning situation according to data analysis, understand

the differences between students, teach students according to their aptitude, promote the comprehensive and personalized development of students, and finally achieve the teaching goal.

In the teaching process, teachers should make full use of a variety of teaching methods, such as case, heuristic, discussion, experience, inquiry, project and so on. For example, taking real-life problems as the teaching introduction, teachers inspire students to carry out group discussion from the perspective of the background and causes of the problems, analyze the knowledge points and ability requirements, and then simulate the solution and implementation of the problems through the combination of experiential practical teaching. Finally, through inquiry discussion and project-based practice, students can master key knowledge and cultivate practical application ability.

5 CONCLUSION

Using the rich network resources and intelligent teaching environment of smart classroom, we can build a student-centered blended teaching model. This paper explores the three-stage teaching mode and teaching methods of online and offline integration, which provides some ideas and references for classroom teaching reform in the environment of smart classroom.

ACKNOWLEDGMENT

This paper is the research result of the Special Subject of Teaching Science Planning in Tai'an City "Research on the Strategy of Improving the Quality of Multimedia Teaching in Primary and Secondary Schools under the Background of" Double Reduction "(Subject No.: TJK202106ZX026).

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