

Construction and Research of the Smart Classroom of Digital Electronic Technology Course Based on Rain Class

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Abstract: Due to the single form of teaching, the lack of interaction between teachers and students, and the lag of teaching feedback, traditional classrooms are often difficult to effectively teach students in accordance with their aptitude and individualized teaching, and greatly lose their appeal to the low-headed people. Smart teaching tools - the emergence of the rain classroom, provides a powerful help to break the "whole class being lectured by the teacher only" mode. Integrating the "rain class" smart teaching tool into the "Digital Electronic Technology" course and constructing a smart classroom model suitable for theoretical course teaching will surely break the bottleneck of the traditional teaching mode. The practice results show that the implementation of the smart classroom attracts students' interest in learning, improves teaching efficiency, and achieves better teaching results.

1. Introduction

With the continuous improvement of the requirements for the comprehensive quality of talents in China's modern production and construction, the positioning of talent training objectives in colleges and universities is also constantly improving. It requires students to have solid theoretical knowledge and have the ability to apply knowledge flexibly. As a basic course for electrical majors, digital electronic technology has a strong theoretical and practical nature and plays a pivotal role in the entire professional talent training program.

Because the "Digital Electronic Technology" course has strong theory, the target audience is Higher Vocational School students, and the basic knowledge of students is limited. Therefore, in the traditional "whole class being lectured by the teacher only" mode, it is easy to appear that students do not have enough confidence in the process of teaching and learning. Also it is difficult to be interested in boring theoretical knowledge, and the classroom atmosphere of the teacher's lecture is difficult to be active. It is difficult for teachers to understand the situation of students' mastery of knowledge, which makes the difficulty of teaching and learning greatly increased. It is also easy for students to lose their dominant position in teaching, which in turn leads to a vicious circle of teaching.

In order to achieve better teaching results, more and more teachers are focusing on education reform. How to improve the quality and the efficiency of classroom teaching has become a hot research topic in education and teaching reform[1]. With the rapid development of modern information technology and Internet technology, the informationization and intelligence of educational methods have also been widely used. The traditional teaching model has suffered an unprecedented impact. The teacher's teaching ability is put forward new requirements, and the teacher's role in teaching activities is also quietly changing. Through the study of the smart classroom, combined with the actual characteristics of the curriculum, the paper introduces the wisdom teaching tool--"rain classroom", constructs a smart classroom teaching mode suitable for digital electronic technology courses, realizes students' mobile learning, mutual aid lectures, and improves the initiative and enthusiasm of students' learning.

2. Comparison of Traditional Classrooms and Smart Classrooms

2.1 Traditional Teaching Mode.

For a long time, influenced by the examination-oriented education, the educational model of teachers such as “whole class being lectured by the teacher only” has blossomed everywhere. Analysis of the academic situation based on the empirical, the unchanging teaching presets, the consistent learning process, and the rough lag evaluation feedback. These characteristics, which are difficult to get rid of in traditional classrooms, also have direct consequences for the lack of attractiveness to students. Students learn boring and teachers teach hard. The teaching which can't stimulate students' interest and curiosity is not a meaningful teaching method[2].

Under the traditional teaching mode, the teaching goal is to teach the learning, and to some extent, the existence of students as the subject of learning is neglected. Learning methods, goals, processes, problems, and evaluations are all single. Students are the focus and center of teaching. The ultimate goal of teaching is to do everything possible to let the students do the masters of the classroom, let the students work hard, mobilize the students' awareness of participation, open the students' thinking, and cultivate the overall quality of the students. The focus of teaching will be successfully transferred to the students themselves. This is not only the transfer of teaching focus, but also the return of teaching[2].

2.2 Smart Classroom Overview.

The shortcomings of the traditional classroom teaching model cannot be solved by the general teaching method. The diversification and personalization of the “smart classroom” constructed by means of informationization not only changed the learning experience of students, but also improved the effect of teachers' teaching[3].

Smart classrooms are data-based. Under the traditional teaching mode, teachers can only measure the learning behavior of students through individual teaching experience, thus designing the teaching process. Smart classrooms can evaluate student learning behavior more objectively and fairly based on big data generated by informationization means, thus helping teachers to better adjust teaching strategies [3].

Smart classrooms are highly efficient. The objective and fair data of the intelligent classroom helps teachers to predict the potential learning needs of the learners more accurately. The rich and varied teaching situations can enable students to receive knowledge in a pleasant state. The timely delivery of teaching resources can satisfy the learner's demands in the first time[3].

Smart classrooms are personalized. Pre-study analysis and classroom test analysis will help teachers better understand the actual situation of each learner's knowledge. Teachers develop targeted teaching plans and coaching strategies, push personalized learning materials, can truly realize “one-on-one” personalized teaching services[3].

2.3 Rain Class.

With the development of information technology, the Ministry of Education's "Education Informatization 2.0 Action Plan" puts forward "intelligent education innovation development action"[4]. The Rain Class is a smart learning public platform jointly developed by Tsinghua University and Xuetang Online. It is a smart teaching tool born in the context of mobile Internet and big data. The platform can be divided into two modules: students and teachers. Student module can implement scanning check-in, course selection, online testing, feedback and barrage interaction. The teacher module has functions such as publishing learning tasks, pushing learning resources, evaluating feedback, and analyzing student data. “Rain Classroom” integrates complex information technology into PowerPoint and WeChat, and establishes a bridge between extracurricular preparation and classroom teaching, so that classroom interaction never goes offline. Using the rain class, teachers can push the pre-study courseware with MOOC videos, exercises, and voices to the student's mobile phone, so that the feedback between teachers and students is more timely; The real-time answering function in the classroom and the interactive function of the barrage also provide a perfect solution for the interaction between teachers and students in the classroom. The

rain classroom scientifically covers every pre-course-class-after-school teaching, provides complete three-dimensional data support for teachers and students, personalized reports, automatic task reminders, and makes teaching and learning clearer[5].

3. Based on the Rain Classroom, the Construction of the "Digital Electronic Technology" Course Wisdom Classroom

3.1 Current Status of Digital Electronic Technology Course under Traditional Classroom.

"Digital Electronic Technology" is a compulsory professional foundation course for the mobile communication technology major of the School of Information and Communication Engineering. It is a basic course for learning modern electronic technology, and it is also a very important main course for electronic information and automation. Through the study of this course, students should master the basic theories in digital electronic technology; learn the analytical design methods of commonly used digital circuits; and develop the ability and practical skills to analyze problems and solve problems. To lay the necessary professional foundation for studying professional courses and post-graduation in related circuit analysis and design work or further study.

Because the "Digital Electronic Technology" course is theoretically strong, the target audience is the higher vocational level students, and the basic knowledge level of the students is limited. Therefore, in the process of teaching and learning, students always lack sufficient learning confidence, and are not interested in boring theoretical knowledge. The classroom atmosphere of the teacher's lecture is difficult to be active, and it is difficult for the teacher to understand the situation of the students' mastery of knowledge, which makes the difficulty of teaching and learning greatly increased.

In order to stimulate students' interest in learning, increase the pleasure of students in the process of learning, improve the state and appeal of students in class, and effectively improve the effectiveness of classroom teaching, teachers should add more interactive links during the teaching process, practice and summarize the knowledge points taught at any time to keep abreast of the student's mastery. Teachers can also arrange some guided previews before class, so that students can take lectures with their own answers and questions. This will not only greatly improve the teaching and learning effects of the subject, but also expand the students' thinking space, enhance the flexibility of applying knowledge, promote knowledge integration, and help students develop independent learning ability and creative thinking ability.

3.2 Building of a Smart Classroom.

In recent years, with the popularity of smart phones, many students in the classroom bowed their heads and played mobile phones. This is a headache for many teachers. How to make full use of mobile phones and turn mobile phones into tools for teaching teachers and students has become the main direction of education and teaching reform.

The "Digital Electronic Technology" wisdom teaching project based on the rain classroom has been in 2018. In the Class 3 mobile communication technology class of the School of Information and Communication Engineering of Liaoning Equipment Manufacturing Vocational and Technical College, the three-month teaching practice was carried out in the course of "Digital Electronic Technology". The teacher introduced the rain class in the theoretical teaching process of the course, and ensured that the wisdom teaching taught more than 60% of the total class time. The main innovation in the construction of this project is to turn the students' low-headed mobile phones into a tool for students to look up, and to change students from passive listening to active learning. The rain classroom software captures the characteristics of students who like to use social software WeChat. The use of mobile phones as a teaching platform is not a blind rejection, but a clever borrowing.

The wisdom teaching process covers teaching in the "rain classroom" mode; completing the PPT courseware in the "Rain Classroom" mode, which includes class content, pre-class preparation and after-school review content, so that students can study at any time; building a "smart teaching"

resource library, which includes courseware resources and test resources; establishing a semester "smart teaching" big data, which includes pre-class data, class data and after-school data; carrying out the "smart teaching" satisfaction survey, forming a smart classroom implementation report, etc.

Using the "Rain Classroom" software, you can push the courseware to each student's mobile phone during class teaching, which is convenient for students to review relevant content, and avoids the cumbersomeness of previous students going to the course website to download relevant content. It is also possible to push the latest courseware directly to the student's mobile phone, so as to avoid the problem of the courseware being hidden by the students sitting behind.

After adopting the "Rain Classroom Teaching", the software automatically generates classroom summary, which can realize automatic name counting and statistics, which is convenient for teachers to manage the classroom teaching process. During the class, the teacher sets the test paper according to the knowledge points, and answers the class to promote the students' concentration. Students interact with teachers in real time through submissions, barrage, etc., so that teachers can master the mastery of all students' knowledge of classroom knowledge.

4. Based on the Rain Classroom, the "Digital Electronic Technology" Course Smart Classroom Implementation Effect

For the teaching of a purely theoretical course such as "Digital Electronic Technology", in the past, teachers used to derive formulas and teach theories. Students are either busy taking notes and delaying the lectures, or they are obsessed with the basic knowledge. Even some students lost confidence from the beginning. After the introduction of the "rain classroom" teaching mode, the teaching and learning of teachers and students have been greatly improved.

4.1 Achievements of Students.

Compared with the traditional classroom, after using the "Rain Classroom" wisdom teaching tool, the students have achieved the following effects mainly after using:

- (1) The mobile phone has changed from the culprit of turning students into low-headed people into a tool for students to look up.
- (2) Let students change from passive lectures to active lectures, from passive irrigated knowledge to active search for knowledge.
- (3) Let the students change from listening to speaking, actively participate in the interaction and discussion in the classroom, and improve the interest and initiative of learning.
- (4) Let the students learn from the goal of "passing the grid" into the learning of "using the use".
- (5) The courseware of the rain classroom is transmitted to the student in real time, which is convenient for students to view and record notes at any time, and solve the contradiction between taking notes and listening to classes.
- (6) Students who cannot understand the place can click "Don't understand" to mark the PPT courseware on the page at any time. They can also communicate with the teacher through submission or barrage, private letter, etc., and no longer can't consult because of embarrassment.

Fig. 1 below shows the process of students actively participating in class lectures and discussions.



Figure 1. Students use the rain classroom tool to actively take lectures

4.2 Achievements of Teachers.

After the “rain class” wisdom teaching tool is embedded in this course, it is different from traditional teaching through three months of use. Teachers mainly have the following benefits:

(1) Teachers can see the situation of each student's lectures and the answers to the exercises in real time, so that teachers can urge students to participate in classroom interactions. However, due to the limited time in the traditional teaching process, teachers are not convenient to watch the students' questions. Fig. 2 shows the teacher watches the student's answer on the mobile phone during the class exercise, and makes a timely comment.



Figure 2. The teacher uses the mobile phone to view the student's answer

(2) Students can click on the records of courseware that they do not understand. The teacher can check how many students do not understand the knowledge points through the mobile phone, and then decide to further explain the knowledge points.

(3) In the course of teaching, the teacher can complete the classroom questions and answers by sending red envelopes, random name and other more flexible and stimulating methods, which further attracts the students' attention and interest in the lectures.

(4) During the course of teaching, the students can also show the students' exercises to the big screen through screening, and explain and comment in the classroom.

(5) students complete the classroom test through the mobile phone, eliminating the trouble of students sitting in the back of the classroom can not see the big screen test questions, but also eliminate the teacher to print the paper test questions, environmental protection. And students and teachers can view the questions anytime, anywhere, as shown in Fig. 3.



Figure 3. Students use the mobile phone to answer questions

(6) Students submit their homework through the mobile phone to realize paperless operation, which not only saves the environment, but also facilitates the teacher's review after class. Teachers

can use the fragmentation time to complete the review of the work, anytime, anywhere, as long as there is a network, the teacher can complete the work and improve the work efficiency.

The teacher's review of the student's homework or test questions can be queried on the Internet anytime, anywhere, open, transparent, and convenient.

(7) Teachers can obtain data such as classroom participation data, job statistics, and test paper analysis through the rain classroom to facilitate the summarization of the teaching process and the writing of data reports.

5. Conclusions

Through the introduction of the wisdom teaching tool of the rain classroom, the teachers and students are more likely to recognize this wisdom teaching mode during the three-month teaching process. It solves the problem that the teaching mode of the teacher is single and rigid, the teacher's reviewing the homework and the test questions are inconvenient, and the teacher can't grasp the mastery of the knowledge of the class students in time. By introducing modern communication tools, it not only facilitates the students' lectures in class, but also solves the contradiction between taking lectures and taking notes. Random name and red envelope rewards also increase students' interest in learning and improve students' learning effects.

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