

Research on the Teaching Reform of Online and Offline Hybrid Teaching Mode Based on Smart Classroom in the "Development of Android for the Internet of Things"

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Abstract: This article aims to explore the teaching reform of the online and offline hybrid teaching mode based on smart classrooms in the course of "Internet of Things Android Application Development". Through in-depth analysis of the characteristics and advantages of smart classrooms, combined with specific cases, the effectiveness and value of this teaching model in practical applications are elaborated. This study is of great significance for improving the quality of curriculum teaching, enhancing students' practical abilities, and promoting teacher-student interaction. It also provides useful reference for promoting teaching reform.

Keywords: IoT Android Development; Smart Classroom; Online and Offline Blended Teaching Mode.

1. Introduction

With the rapid development of information technology, the application of the Internet of Things and Android platforms in fields such as smart homes, logistics tracking, and agricultural monitoring is becoming increasingly widespread. In order to meet market demand, many universities have offered the course 'Internet of Things Android Application Development'. However, traditional teaching models often prioritize theory over practice, which cannot meet the actual needs of students. Therefore, how to reform the teaching mode and improve the quality of course teaching has become an urgent problem to be solved.

2. Overview of Smart Classroom

Smart classroom is a new teaching mode that focuses on students and is supported by information technology, achieving a combination of online and offline teaching. It utilizes technological means such as the Internet, big data, and artificial intelligence to comprehensively digitize and upgrade teaching activities. Smart classrooms achieve intelligent and personalized teaching processes through real-time tracking of students' learning situations, personalized recommendation of learning resources, and diversified evaluations.

3. Application of Smart Classroom in "Android Application Development of the Internet of Things"

3.1. Project based Teaching

The teacher divides the students into several groups, each of which needs to complete a practical IoT Android application development project. Students need to conduct project requirements analysis, design, coding, testing, and optimization on the smart classroom platform. Through this approach, students can better master the knowledge and skills of IoT Android application development, while improving team collaboration and innovation abilities.

In project-based teaching, students need to conduct project needs analysis under the guidance of the teacher. The specific steps are as follows:

(1) Determine the project theme and objectives: Students need to work with teachers to determine the project theme and objectives, and clarify the actual application scenarios and requirements of the project.

(2) Conduct market research: Students need to conduct market research to understand the functions, characteristics, advantages and disadvantages of similar projects, and provide reference for project design and development.

(3) Analyze user needs: Students need to work with teachers to analyze user needs, including user expectations, requirements, and limitations for the project, in order to determine the functionality and characteristics of the project.

(4) Determine project functions and characteristics: Students need to determine the functions and characteristics of the project based on market research and user demand analysis results, and develop corresponding design plans.

(5) Develop project plan: Students need to develop a project plan based on the project design plan, including the project schedule, personnel division, budget, etc.

(6) Project implementation: Students need to implement the project according to the project plan, including coding, testing, optimization, and other aspects of the project.

(7) Conduct project evaluation: Students need to conduct project evaluation under the guidance of the teacher, including the presentation of project results, effectiveness evaluation, experience summary, and other links.

3.2. Problem Oriented Learning

The teacher will create micro videos or PPTs of the key and difficult content in the course, and upload them to the smart classroom platform. Students need to preview these contents independently before class, and engage in in-depth discussion and communication in class. Through this approach, students can better understand and master the course content, while improving their self-learning and problem-solving abilities. Here are some possible cases:

(1) Design and Implementation of a Smart Home Control

System: This project allows students to design and implement a smart home control system, including device connection, data collection, and remote control. Students can understand the relevant knowledge of Internet of Things technology and Android platform, and be able to implement a practical smart home control system.

(2) IoT based logistics tracking system: This project allows students to design and implement an IoT based logistics tracking system that tracks the location and transportation status of goods in real-time using technologies such as GPS and RFID. Students can gain knowledge about the Internet of Things and Android platforms, and be able to implement a practical logistics tracking system.

(3) Design and Implementation of an Intelligent Agricultural Monitoring System: This project allows students to design and implement an intelligent agricultural monitoring system that uses technologies such as sensors and cameras to monitor crop growth and environmental parameters. Students can gain knowledge about the Internet of Things and Android platforms, and be able to implement a practical intelligent agricultural monitoring system.

(4) Intelligent Parking System Based on the Internet of Things: This project allows students to design and implement an intelligent parking system based on the Internet of Things, which uses technologies such as sensors and cameras to detect the occupancy of parking spaces and the parking location of vehicles. Students can gain knowledge about the Internet of Things and Android platforms, and be able to implement a practical intelligent parking system.

3.3. Flipped Classroom

Teachers will create micro videos or PPTs of the core knowledge points in the course and upload them to the smart classroom platform. Students need to preview these contents independently before class, and engage in in-depth discussion and communication in class. Through this approach, students can better grasp the core knowledge points of the course, while improving their self-learning and cooperative learning abilities.

4. Application Effect and Significance

By introducing a smart classroom in the course 'Internet of Things Android Application Development', we have achieved the following application effects and significance:

(1) Improving teaching quality: The application of smart classrooms enables teachers to better understand students' learning situations and progress, thereby enabling timely adjustment of teaching strategies and progress, thereby improving teaching quality. For example, through the data analysis function of the smart classroom platform, teachers can track students' online learning status, homework completion status, and other data in real-time, in order to timely identify problems and take corresponding measures.

(2) Enhancing students' practical abilities: The application of smart classrooms allows students to have more opportunities to participate in practical projects, thereby improving their practical and teamwork abilities. For example, in project-based teaching, students need to complete an actual IoT Android application development project within the specified time, which undoubtedly improves their practical and team collaboration abilities.

(3) Promoting teacher-student interaction: The application of smart classrooms enables more convenient interaction and communication between teachers and students, thereby

improving students' learning effectiveness and satisfaction. For example, in problem oriented learning, students can ask questions to teachers or communicate with classmates on a smart classroom platform, which undoubtedly improves their learning effectiveness and satisfaction.

(4) Promoting teaching reform: The application of smart classrooms has enabled the improvement and optimization of traditional teaching models, thereby promoting the process of teaching reform. For example, by flipping the classroom, teachers can allocate more classroom time to students for discussion and practical operations, thereby improving students' learning effectiveness and practical abilities.

(5) Cultivating students' self-directed learning ability: Smart classrooms provide rich learning resources and diverse learning methods, allowing students to engage in self-directed learning according to their interests and needs. For example, students can watch micro videos, read relevant literature, participate in online tests, etc. on the smart classroom platform, in order to better grasp the course content. This helps to cultivate students' autonomous learning ability and lifelong learning habits.

(6) Implementing personalized teaching: Smart classrooms can provide personalized learning resources and teaching plans based on students' learning progress and ability level. For example, for students with slower learning progress, the smart classroom platform can push relevant micro videos and exercise questions to help them better grasp the course content; For students with higher abilities, the smart classroom platform can promote higher level learning resources and developmental practice questions to stimulate their learning potential. This helps to meet the needs of different students and achieve personalized teaching.

(7) Promoting the transformation of teacher roles: The application of smart classrooms has transformed the role of teachers from traditional knowledge imparters to students' learning guides and partners. For example, in flipped classrooms, teachers need to record micro videos in advance and develop learning task lists, and then provide in-depth explanations and guidance in class to help students solve problems encountered in learning. This helps to improve teachers' educational and professional abilities.

In summary, the blended online and offline teaching mode based on smart classrooms has broad application value and promotion significance in the teaching reform of the course "Internet of Things Android Application Development". It can not only improve the quality of teaching and students' learning outcomes, but also enhance students' practical and team collaboration abilities, promote teacher-student interaction and learning satisfaction. At the same time, the application of smart classrooms can also cultivate students' self-learning ability, achieve personalized teaching, promote the transformation of teacher roles, and promote the development of educational informatization. Therefore, we should actively explore and practice online and offline blended teaching models based on smart classrooms to better meet students' learning needs and improve educational and teaching levels.

5. Summary

This article conducts research and analysis on the teaching reform of the online and offline hybrid teaching mode based on smart classrooms in the "Internet of Things Android Application Development". It is concluded that the online and offline hybrid teaching mode based on smart classrooms can

effectively improve teaching quality, enhance students' practical abilities, promote teacher-student interaction, and promote teaching reform, which has high application value and promotion significance.

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