# Blended Equipment Operation Teaching Based on Smart Teaching Platform

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**Abstract.** Colleges and universities serve as the primary hubs for nurturing skilled professionals, and the equipment operation course plays a crucial role in their training. Therefore,it is very important to explore the teaching method of the new equipment operation course. With the rapid development of artificial intelligence, virtual reality, and multimedia technology, it has provided us with more technical support.This study utilizes emerging science and technologies to introduce a novel blended teaching approach for equipment operation courses. By incorporating a variety of smart teaching methods and seamlessly integrating online and offline, in-class and after-class teaching modes, we aim to address the existing problems in equipment operation teaching.

**Keywords:** Smart teaching · Equipment operation · Blended teaching · Teaching mode

## 1 Introduction

Colleges and universities serve as vital platforms for cultivating skilled professionals, [1]. The equipment operation course in col-leges and universities assumes a crucial role in training professionals in equipment maintenance and utilization, as well as command and management positions [2]. The equipment operation course has distinct characteristics, that is equal emphasis on theory and practice [3]. As such, it not only serves as an important part of the curriculum system in colleges and universities, but also establishes itself as a course oriented towards employment and practical skills development. Hence, it holds significance in boosting the development of equipment operation courses, expediting the revamp of equipment operation teaching, and enhancing the instructional quality of equipment operation.

## 2 Problems in Conventional Equipment Operation Teaching

### 2.1 Sophisticated Equipment and Finite Class Hours

As a specialty opened for the graduating class, the equipment operation course requires students to integrate all the previous knowledge they have learned. This entails not only a deep understanding of the theoretical knowledge of equipment and a mastery of the

structure of equipment, but also the ability to operate and maintain equipment skill-fully. Most students have not had prior experience with the equipment before attending the class, which hinders their ability to develop a comprehensive understanding of its functionality. If students operate equipment hastily, potential risks may arise.

### 2.2   Shortage of Necessary Teaching Resources

The shortage of teaching approaches and resources within the classroom imposes limi-tations on teachers' instructional design, leading to a monotonous teaching pattern char-acterized by a "teacher-dominated" approach. In this mode, teachers assume a central role in the teaching process, but excessive control hampers students' creative thinking and undermines their ability to engage in independent learning and exchange ideas. What's more, their enthusiasm for learning may be lowered by the tedious teaching content, which leads to poor teaching effects. Overall, the equipment operation course for the graduating class exhibits a fast pace and a substantial volume of information. Students are required to digest and absorb a significant amount of knowledge outside of class. However, there is a lack of supplementary learning materials beyond the pro-vided course materials, which poses challenges to self-study. While students can gather questions and seek clarification from the teacher, the effectiveness of this approach falls short of expectations.

### 2.3   Difficulty in Establishing Objective and Effective Teaching Evaluations

Teaching evaluation is to evaluate the "value" of teaching and learning. Due to the single teaching means and finite teaching resources, the teaching evaluation method is relatively single. The manual production of test questions focuses on specific knowledge points in the test bank, resulting in a limited number of questions that fail to adequately reflect students' mastery of the equipment. And the theoretical test, which uses real examination paper, requires considerable time to grade and calculate the error rate of each knowledge point, making it difficult to form a scientific and effective teaching evaluation. Moreover, the equipment operation test is subject to teacher supervision, where scoring is based on students' operational proficiency. Thus, it is easily affected by subjective factors, rendering the evaluation results less scientific.

## 3   Smart Teaching Platform and Its Characteristics

The introduction of a smart teaching platform, as a mix of smart technologies, enriches the teaching approaches and improves teaching efficiency. Smart teaching platform has transformed both students' learning methods and teachers' teaching modes, leading to great advancement in education. One notable transformation is the shift from a teaching-centered mode to a student-centered mode [4]. From the students' perspective, the smart teaching platform fosters their interest and motivation in learning, allowing them to effectively utilize fragmented time for studying, thereby increasing their learning hours and enhancing learning efficiency [5]. From the teachers' perspective, the smart teaching platform brings new teaching tools and methods into the classroom, captivating students' attention, igniting their enthusiasm for learning, and providing educators with innovative teaching ideas and approaches.

The smart teaching platform mainly presents the following characteristics:

### 3.1 Strong Interactivity

The primary distinction between traditional teaching and smart teaching lies in the contrasting dominant instructional modes. The smart teaching platform is characterized by a highly interactive teaching approach. The learning resources on the smart teaching platform are predominantly found in individual learning portals. Additionally, students' learning portals can be interconnected and linked to teachers' teaching portals, so that questions can be discussed in real-time. Each portal is connected to the intelligent interactive TV positioned at the front of the classroom. Teachers can display typical problems, knowledge points, or equipment models on the large screen for in-depth discussion and study, thus greatly facilitating learning and communication.

### 3.2 Strong Flexibility

With the utilization of smart teaching platforms, teachers are no longer confined to a single teaching method but can employ a diverse range of instructional approaches, such as information technology, computer technology, video transmission technology, etc. Through online platforms and other means, teachers can transcend time and space to conduct teaching activities. Students, on the other hand, can access a wealth of high-quality educational resources, including MOOCs, SPOC courses, micro-courses, and other courses from various universities through network resources [6]. This greatly expands the learning channels of college students, so that the class is no longer limited to forty minutes or one or two hours. Consequently, students can engage in learning both during and outside of class.

### 3.3 Strong Motivation

The smart teaching platform provides students with richer and more flexible ways to learn. As a result, they can engage in deeper interactions with teachers and classmates, becoming more actively involved in class both emotionally and physically. This increased engagement naturally fosters greater motivation for learning and gradually transforms passive learning into active learning.

## 4 A New Mode of Equipment Operation Teaching

The smart teaching platform covers many categories of science and technology. At present, the application of the smart teaching platform mainly involves teaching theoretical knowledge, communicating, and interacting through textual means, followed by examination and evaluation. However, it is not enough to rely solely on the existing smart teaching methods when it comes to equipment operation courses in colleges and universities; it is imperative to explore a new smart teaching mode suitable for the characteristics of the course. Hence, in this paper, we discuss the use of a blended teaching mode for equipment operation with mixed smart teaching methods. Adhering to the idea
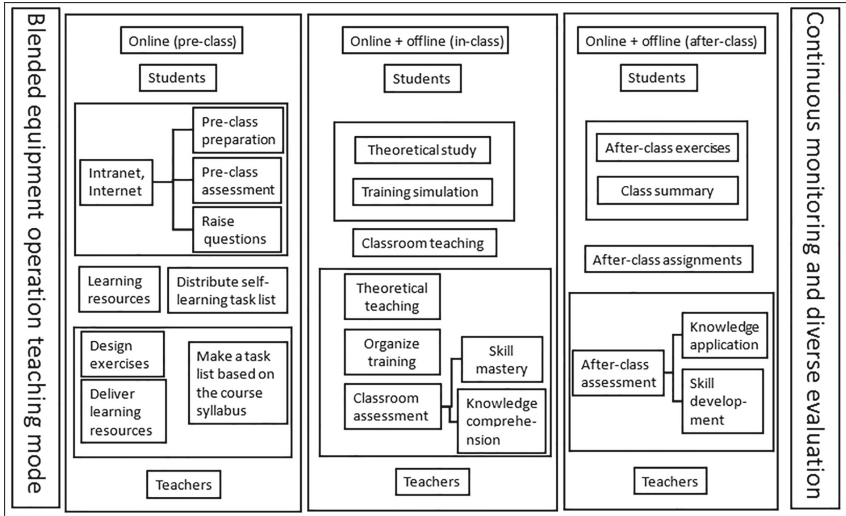
**Fig. 1.** Blended Equipment Operation Teaching Mode Based on Smart Teaching System

of "teacher as the guiding role and students as the main body," this mode emphasizes the importance of practical operation training, so that students can attain predefined learning objectives through extensive training after gaining a solid understanding of the technical principles behind the equipment. Teachers mainly leverage the Intranet, Internet, computer room, professional classroom, equipment, and other resources. They employ various teaching methods, including online and offline, in-class and after-class, to deliver theoretical instruction, facilitate real-time interaction, enable online learning, and provide training simulations, thus achieving the purpose of theoretical knowledge teaching and improving operational skills. Additionally, the smart teaching platform enables the tracking of students' learning progress throughout the teaching process. It allows for real-time assessment of their knowledge mastery, identification of areas of weakness, and comprehensive evaluation from multiple perspectives (Fig. 1).

### 4.1  Pre-class Preparation

Pre-class preparation is mainly completed by online learning. Teachers make a self-learning task list according to personnel training programs, course syllabi, and teaching materials. The list specifically includes learning guides, learning tasks, doubts, and suggestions. Among them, the learning guides "guide" students to learn well and reflect teachers' guiding role in students' self-learning. The guides contain learning objectives, mind maps, and a preview of classroom teaching forms. "Learning tasks" are the core of the list. The design of learning tasks needs to factor in teaching objectives, teaching contents, and learners' characteristics, and fully consider the initiative and progress of learning. "Doubts and suggestions" refer to the difficulties encountered by students in the process of self-learning and the corresponding solutions. Students can send their questions to the smart teaching platform and invite teachers and classmates for discussion [7].

Teachers should develop appropriate pre-class exercises based on the previewed contents to effectively assess students' understanding. This involves gathering learning resources from various channels such as the Internet, Intranet, and MOOCs in advance. Subsequently, they upload the preview resources and the learning task list to the cloud server through the teacher portal for students to access. Guided by the list, students are able to complete the preview tasks through autonomous or cooperative learning, and then put forward the difficulties in preview and seek assistance and answers from both teachers and their peers.

### 4.2 In-Class Tutoring

**Teacher Guidance**
This process aims to assess students' comprehension of the previewed contents. Teachers address students' doubts during the preview. At the same time, they put forward thought-provoking questions to encourage students to share their perspectives without immediately evaluating their answers. This encourages students to bravely expound their own views and foster their ability to express themselves. The correct answers can be supplemented by the students during or after the class, and the teachers can provide a summary and feedback based on the discussions.

**Theoretical Teaching**
According to students' preview, teachers can flexibly adjust their teaching contents and methods. Theoretical teaching can be conducted on the smart teaching platform utilizing one or more of the following teaching methods:

1. The gathered video materials can be displayed on the large screen through the teacher portal. Simultaneously, interactive platforms like discussion forums or communication software can be accessed. Students have the opportunity to raise questions through these interactive tools while listening to the lectures, and teachers can provide timely responses and clarifications.
2. Since the structure of the equipment is relatively complex, a 3D model of the equipment can be built and shared through the teacher portal. During the class, the model can be sent to the student portal according to the students' mastery of knowledge points. Students can scrutinize the structure of the equipment with 3D modeling software to improve learning efficiency [8].
3. Considering the characteristics of equipment operation teaching, proficiency in equipment operation is crucial. To help students master the equipment operation method, they can remotely watch the real-time operation of personnel in the demonstration class through the video transmission system; thus, they can clearly see the operation steps within the equipment. This approach overcomes the limitations of space and geography, eliminating the need for physical transfers between locations.

**Training Simulation**
The teaching of equipment operation in vocational colleges aims to improve students'

ability to use the equipment. Students have yet to acquire operational skills for the equipment following their theoretical study. Directly operating the actual equipment may pose risks of harm to both personnel and the equipment. Therefore, prior to the actual operation, students can use the simulator to simulate the operation process. This involves practicing the operation process in the professional classroom through virtual reality simulation technology [9]. The equipment simulator is also fitted with an assessment system, which can evaluate students' operation levels. Based on the assessment results, teachers can provide feedback and comments on students' performance. Only when the assessment system shows that the student meets the requirements for actual operation are they allowed to carry out the actual equipment operation.

### 4.3   After-Class Promotion

After class, the teacher makes homework assignments for each student according to individual learning record on the platform and send the exercises through the teacher's portal [10]. An interactive platform is also made available for students to ask questions and engage in discussions. Teachers can correct students' homework in time through the platform and provide personalized guidance according to the completion status of assignments, so as to "teach students in accordance with their aptitude."

## 5   Conclusion

Despite the current level of maturity of the smart teaching platform, more information technologies will be integrated with education and teaching as science and technology continue to advance. Blended teaching, which combines various smart teaching methods, has the potential to become the prevailing mode in equipment operation teaching. By extensively employing emerging technologies, complex challenges in equipment operation teaching can be effectively addressed, leading to improved teaching quality and the attainment of talent cultivation goals in colleges and universities.

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