The Construction and Application of Experimental Course Resources Based on Pan Ya Platform

Taking Computer Operating System Course as an Example

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Abstract. Aiming at the problems existing in the experimental teaching of Computer operating system in our school, such as less class hours, students' low learning enthusiasm and low efficiency of pre-class preview, this paper studies and applies the construction of online course resources. Relying on the relatively mature Pan Ya platform, we will construct computer operating system network courses. Using this platform, teachers upload experimental materials before class for students to preview, and give students plenty of time for practical operation and research in offline experimental teaching. After class, students upload experimental results and analysis, problems encountered in the experiment, and teachers analyze and summarize uploaded content. Practice has proven that this platform can stimulate students' interest in learning and enhance their practical skills. Through comparative experiments, it has been proven that using this platform can achieve very good teaching results.

Keywords: Operating System; Experimental Teaching; Pan Ya platform

1 Introduction

Computer operating system Course is a compulsory professional practical course for engineering students in universities. It is designed for students majoring in computer science and technology, aiming to improve their abilities in designing, debugging, and developing Computer operating system modules, and lay a foundation for future work in software and hardware. The experimental equipment used in this experimental course is the S5p4418 experimental box from a company in Wuhan, which includes two parts: Android experiment and Linux experiment. Considering the limited experimental hours, the main focus is on conducting Android experiments. At the same time, according to students' interests, the teacher will upload some Linux experimental materials on the Fanya platform to change some of the problems encountered in traditional experimental teaching, as follows:

(1) Insufficient Practical Aspects.

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The traditional practical stage mainly tests students' understanding and simple application of the knowledge learned, lacking comprehensive and engineering practical stages.

(2) Fast Update of Computer Operating System

Computer operating system has undergone rapid development in recent years, but in traditional teaching models, the textbooks used in theoretical courses have been slowly updated and cannot keep up with the development of the times.

(3) There is a Certain Gap Between Theory and Practice

The course of Computer operating system requires students to have strong hands-on skills. If teachers only explain the basic knowledge of Introduction to Computer operating system in classroom teaching, it will be difficult for students to understand or even dull. The traditional teaching mode only includes theoretical and experimental teaching, and the experimental course content is mostly matched with the laboratory's experimental boxes. The experimental content often remains unchanged for several years, making it difficult to introduce new technologies into the company.

With the development of the Internet, various teaching methods such as online and offline teaching, MOOC teaching, and flipped classroom are gradually integrating with traditional teaching methods. Based on the relatively mature Pan Ya platform, the author constructs an Computer operating system experimental network course according to the specific situation of students. After more than two years of course construction and use, the online and offline experimental teaching of the Introduction to Embedded Systems course has become possible, breaking through the time and space limitations of traditional experimental teaching. After more than two years of course construction and use, the online and offline experimental teaching of the Introduction to Computer operating system course has become possible, breaking through the time and space limitations of traditional experimental teaching.

2 Experimental Courses Based on the Pan Ya Platform

2.1 Preliminary Construction

Table 1. List of Experimental Projects

Order Number	Experiment Type	Experimental Projects
1	Basic Experiments	The use of commonly used commands in Linux
2		Use of Vim Editor
3		Writing C Language under Linux
4	Core Experiments	Process creation
5		Process scheduling algorithm simulation
6		Dynamic partition allocation method
7	Selected Experiments	File backup
8		Simple file system simulation

Based on the requirements of our school's Computer operating system experimental curriculum and talent cultivation plan, as well as the existing experimental

equipment, we have re integrated various experimental projects and written experimental documents and videos according to the characteristics and difficulties of each sub project in the Computer operating system experiment. Through the Fan ya online teaching platform, teachers upload electronic materials to the platform and establish online Computer operating system experimental courses. The specific list of experimental projects is shown in Table 1[6].

This article focuses on the construction of online courses through four modules: experimental principles, experimental code, video, and experimental expansion. The content and purpose of each module are shown in Table 2. The construction of online courses is mainly based on experimental course videos, with experimental principles and experimental codes as auxiliary teaching materials. The video content uploaded on the teaching platform is carefully designed and recorded by teachers. During the recording process of each video, simple questions can be appropriately interspersed according to the specific experimental content to consolidate the knowledge point and increase students' further thinking about the experiment. Based on students' answers to the questions, students' mastery of the experimental video content can be measured.

Table 2. Composition of Online Courses

Course Structure	Specific Content	Experimental Purpose
Experimental Course Standards	Experimental purpose, principle, instrument	Understand the purpose of the experiment, understand the principles, and be able to use instruments
Experimental Video	Process demonstration and principle explanation	Demonstrating the key and difficult content of the experiment to help students learn the experiment
Result analysis	Record experimental results and analyze them	Enhance their understanding of experimental principles and test learning effectiveness through analysis of the results
Experimental Expansion	Choose experiments, extracurricular materials, embedded related links, fun videos, new products	Enhance students' understanding of embedded knowledge and broaden their horizons

The experimental content in Table 1 is divided into mandatory experiments and optional experiments. The mandatory experiments require all students to complete them, and the optional experiments belong to the expansion part of the experiment, mainly providing resources for students who have a certain foundation and are interested in the experiment, and providing them with further learning. The expansion of the experiment not only includes selecting experiments, but also includes some latest news reports, journal literature, links, interesting videos, embedded new products, and other aspects related to embedded technology both domestically and internationally. This approach not only enhances students' interest in learning, but also enables them to grow their knowledge and broaden their horizons.

2.2 Mid Use Stage

Before students can use the platform, teachers must import the student list of the teaching class into the platform, establish online learning classes and discussion groups, upload the completed course resources to the platform, and make them available to students. Students can access it through computer web pages or use mobile phone client apps to learn anytime and anywhere according to actual needs, without being limited by traditional teaching time and space. This helps to complete tasks such as experimental teaching objectives, principles, use of experimental instruments and equipment, and experimental operation steps. According to a survey, 62.5% of students access it through mobile clients, while only 37.5% use computer web versions[1-3]. This indicates that students prefer to use more convenient mobile clients (such as mobile apps) for experimental teaching and learning.

Teachers use the platform to grasp students' preview situations and answer their questions in a timely manner, achieving teacher-student interaction. At the same time, it also reduces the time for unified explanation of experimental principles in offline experimental teaching, providing students with more ample time for offline practical operations and thinking[4-5]. In offline experimental teaching, teachers focus on providing differentiated guidance to students with different foundations, in order to achieve the goal of individualized teaching, thereby improving the teaching effectiveness of offline experimental courses and breaking through the limitations of traditional experimental teaching. The traditional experimental teaching process often involves teachers first explaining the experimental principles through multimedia, and then uniformly demonstrating the experimental process. This leads to two problems, firstly, students in the front row can clearly see the demonstration process, while students in the back row of the classroom often cannot see it clearly or even cannot see it. Secondly, students with different foundations have different receptive abilities. Some students are able to keep up with the teacher's pace in conducting experiments, while others cannot complete the experiment once they cannot keep up with a single step. Moreover, it is difficult to remember all the steps in the entire experimental process at once. However, for video materials uploaded to online teaching platforms, students can review and pause based on their actual situation, repeatedly watch difficult knowledge, and consult relevant materials after class, providing convenience for students with different foundations to learn. Figure 2 shows the required experiments for the Introduction to Embedded Systems course offered by our school through the Fanya platform, and the duration of students watching the experimental videos. From the results in the Fig.1, it can be seen that the longest viewing time is about three times the average viewing time, indicating that some students actively engage in repeated learning through video, which is also something that traditional experimental teaching cannot achieve, reflecting its advantages.

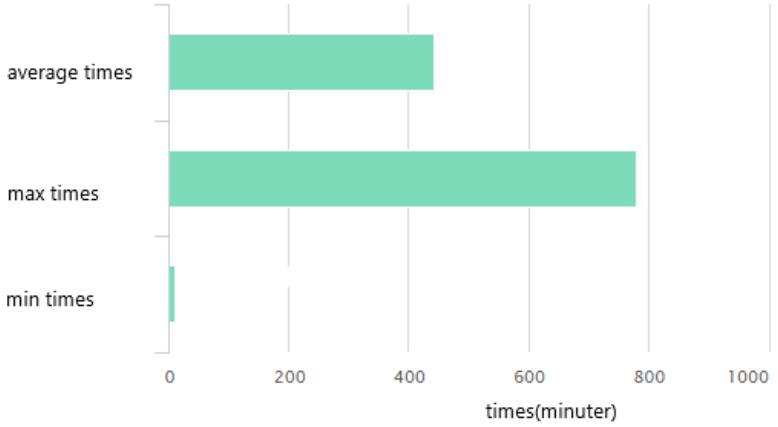

Fig. 1. Student Watching Video Time

In experimental operations, if students encounter problems, they can solve them by reviewing experimental videos, discussing with classmates, or seeking advice from teachers. This greatly shortens the collective experimental teaching time of teachers, leaving limited experimental time for students to personally operate, thereby improving students' hands-on and innovative abilities.

In traditional experimental teaching, although experiments are also divided into mandatory experiments and elective experiments, the implementation of elective experiments is relatively cumbersome. Firstly, students need to choose topics that they are interested in. If the topics chosen by the whole class are scattered, the teacher may find it very difficult to arrange the experimental time specifically, and even result in some selected experiments not having time to do or finding extracurricular time to arrange, which cannot meet students' learning interests. In online courses, the selection of experiments can proceed smoothly even if only one student chooses the topic due to the complete platform materials. Students conduct pre class previews through the Pan Ya network platform, and conduct practical operations through the video content learned in offline experimental classes. Most of the experiments can be completed independently, truly enabling interested students to choose experiments and achieve diversified and differentiated experimental teaching combinations[6-8].

The number of times students visit the platform, the experimental preview situation, including video learning and question answering, will be automatically converted into the grades of each student based on the proportion of each teaching link set by the teacher. At the same time, teachers provide each student's final score based on their operations, system ratings, experimental results, and experimental reports, making the experimental evaluation more scientific and reasonable.

2.3 Post Adjustment Stage

After a semester of use, there are still many imperfections in the platform, such as

insufficient student activities and inactive topic discussions. In the later stage, this problem can be solved by continuing to upload cutting-edge technology development tools, computer employment hotspots and technology hotspots, and improving the weight score of the discussion section in the entire experimental teaching score. In addition, there are also some students who have resistance towards the new teaching method, are unwilling to watch videos for pre class preview according to the requirements, and have low learning ability to operate independently in class. Further research is needed to change this concept[9].

3 Comparison of Teaching Effectiveness

In order to check the learning effectiveness of students using the platform, the author com-pared the final grades of students in the experimental class using the platform with those in the regular class not using the platform. The results are shown in Table 3. The average score of the experimental class is 86.53 points, while the average score of the regular class is 79.18 points. In addition, it can be seen from the table that 18 out of 45 students in the experimental class have a total score of 90 or above, accounting for 40%, while only 6 out of 50 students in the regular class have a score of 90 or above, accounting for 13.3%. This indicates that the teaching effect of the experimental class in the near future is better than that of the regular class.

Table 3. Comparison and Analysis of Final Grades of Two Classes

Class	Number of people	<60分	60~79分	80~89	≥90
Experimental class	45	0	7(15.6%)	20(44.4%)	18(40%)
Regular class	45	1(2.2%)	16(35.6%)	22(48.9%)	6(13.3%)

4 Conclusion

The online experimental course "Computer Operating System" based on the Fanya platform, combined with modern educational concepts, provides a novel online teaching method for students. The experimental teaching videos uploaded on this platform can reduce the process of teachers repeatedly explaining knowledge points in the classroom, leave limited teaching time for students, increase their hands-on practical operation time, and improve their self-learning and innovation abilities. In offline experimental operations, teachers only focus on individual problems, error prone problems, and expanding knowledge, providing different levels of guidance to different students, thus achieving hierarchical teaching. In offline experimental operations, teachers only focus on individual problems, error prone problems, and expanding knowledge, providing guidance at different levels to different students. Through this approach, true hierarchical teaching can be achieved, freeing teachers from mechanical teaching explanations and giving them more time to focus on guiding experimental innovation. Students have gained an understanding of the purpose and princi-

ples of the experiment through previewing on the platform at the front line of the class, and can directly conduct experiments in the classroom, thereby improving the efficiency of experimental learning[10].

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