

Reform and Exploration of Online Teaching Method of Automatic Control Principle

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Abstract: Because of the epidemic prevention and control, in the face of the delayed opening of the school, the Institute of Information and Control carefully studied the requirements of the country and the province, and under the leadership of the leadership of the Institute, the hot online online teaching was carried out to ensure that students were "suspended from classes". The course of automatic control principle is a professional basic course for automation, electrical engineering and automation majors.

Keywords: Epidemic Prevention, Automatic Control, Professional Construction.

1. Significance of the Project Research

The principle course of automatic control is a professional basic course and main course of automation, electrical engineering and automation major. The course content is highly theoretical and systematic. This course is an important basis for follow-up courses such as process control system, motor drag control system, computer control technology, electrical transmission and its control and industrial control configuration software and application, and also an important basis for theoretical analysis and design of control system.

This course introduces to the students the basic theory of automatic control and engineering analysis and design method, make the students master the basic concept and basic principles of linear closed-loop control system, learn to use the method of classical control theory analysis and design of automatic control system, namely the use of time domain method, root trajectory method, frequency characteristic method to analyze and design the automatic control system.

The teaching objectives of this course and the support for the graduation requirements are started from the following directions. 1. Engineering knowledge: I have the mathematics, natural science, engineering foundation and professional knowledge required for the electrical engineering industry, and I can use these knowledge to solve the general engineering problems in the field of electrical engineering. 2. Problem analysis: It can apply the basic principles of mathematics, natural science and engineering science to identify and model engineering problems in the field of electrical engineering, and analyze general engineering problems through literature research to obtain effective conclusions. 3. Design / development solutions: Can design solutions for general engineering problems in the electrical field, design systems, units (components) or processes that meet specific needs, and can demonstrate innovation in the design process. To train students to use scientific principles and engineering methods for solving model analysis of specific problems in electrical engineering field; to use basic scientific principles and mathematical models to analyze and compare general engineering problems in electrical field; to design systems, units (components) or process processes to meet specific needs, and to reflect preliminary innovation consciousness in the design process.

2. Content of Reform

2.1. The Teaching Content Is Mainly Applied

One of the core concepts of engineering education professional certification is the "achievement-oriented" concept, which focuses on what students learn, rather than what teachers teach. The teaching method in class is inconsistent with the student-centered teaching concept, so the student-centered and teacher-guided teaching method is adopted in the teaching process. In the teaching activities, the students study in advance according to the guidance of the teachers, and the teachers give guidance and extension according to the students' problems. According to the students' learning ability level, the teaching progress and process are adjusted in real time, so as to ensure that each student can achieve the learning objectives of the course. This teaching mode can greatly improve student participation, reflect the student-centered teaching philosophy; and teachers play a guiding and auxiliary role in the teaching process, can improve the efficiency of students' learning.

In the first semester of the 2022-2023 academic year, the level 21 electrical major automatic control principle course was taken as an example. At the beginning of the summer vacation and the epidemic was repeated at the beginning, the school once again decided to use temporary online teaching to ensure the normal teaching progress and order.

2.2. Preparation of Course Teaching Materials

This course is one of the core courses of automation, and also the professional course examination subject of automation major. The teachers have three — s, Guo Rui (21 Electric 4,5), Zhang Ying (21 Electric 1,2), and Li Yuxian (21 Electric 3,6). In the process of preparing teaching materials and preparing lessons, we have always kept close communication online, maintaining a high degree of consistency from teaching content to teaching methods and teaching methods. According to the teaching experience of the last round, we have improved the teaching content, teaching process arrangement, experimental Settings, and formed the teaching plan, teaching calendar, experimental instructions and other relevant documents.

名称	修改日期	类型	大小
教案	2022/8/17 15:26	文件夹	
课件	2022/8/23 18:08	文件夹	
实验项目卡-电气	2022/8/23 18:12	DOCX 文档	30 KB
信息与控制学院实验(项目)考核表-自动控制...	2022/8/15 22:01	XLS 工作表	11,641 KB
自动控制原理实验开出率电气及其自动化1-6	2022/8/23 18:12	XLS 工作表	21 KB
自动控制原理实验指导书	2019/3/6 12:18	DOC 文档	496 KB
综合、设计性实验申请表-21电气1-6班	2022/8/15 22:06	DOCX 文档	16 KB
综合性、设计性实验申请汇总表-21电气1-6班	2022/8/15 22:15	XLSX 工作表	12 KB

Figure 1. Archive File

2.3. Preparation for Online Teaching

In 2019, the course "Principles of Automatic Control" applied for the credit course program. This program provides a comprehensive online teaching platform. Our college has registered for teachers and students. After the test class, to the first class, and then to the Tencent conference synchronization, share the screen. After two weeks of evolution, the running-in with my students has achieved a very good effect. From my initial confusion to my current good communication and cooperation with the students, I have developed a strong interest in such an online teaching mode.

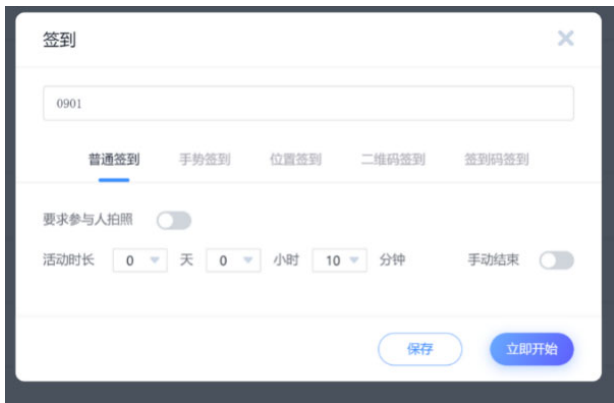


Figure 2. Sign in record

In the past three years of the epidemic, teachers have had sufficient experience in many online teaching. However, what is different from the previous teaching process is that teachers could not see the situation and state of the students opposite them, so they were still very nervous before the first formal class. Class 1-2 started at 8:10. Teachers entered the Tencent meeting 10 minutes in advance and issued the sign-in order because they were worried that the crowded Internet would affect the check-in order. To ensure that students are fully prepared before class.

For such a highly theoretical course, with calculation, drawing and experimental simulation of a course, using these means, the students in the teaching process is too intuitive. And it can receive real-time feedback from students, find problems and solve problems in time. Using Tencent conference and qq at the same time, common feedback, each effective method, fully mobilize the enthusiasm of students in learning.



Figure 3. Online Training Record

According to the teaching schedule, I entered the first experiment, let the students install the software, demonstrate to the students, screen sharing, teach the specific way to use the software, and then the teacher does an experiment first, and then the students do it. After mastering an experiment, the following students will basically operate. The teacher only needs to demonstrate the problems that need to pay attention to in the experiment and the results of the final experiment. Students were well engaged and sent their own experimental results immediately after completing a task. Then, at this time, there will certainly be students' problems, he will ask questions directly in the group, the teacher answered his questions, in the group, and finally most of the students can complete the experiment, feeling and theory ratio, students prefer to do experiments.

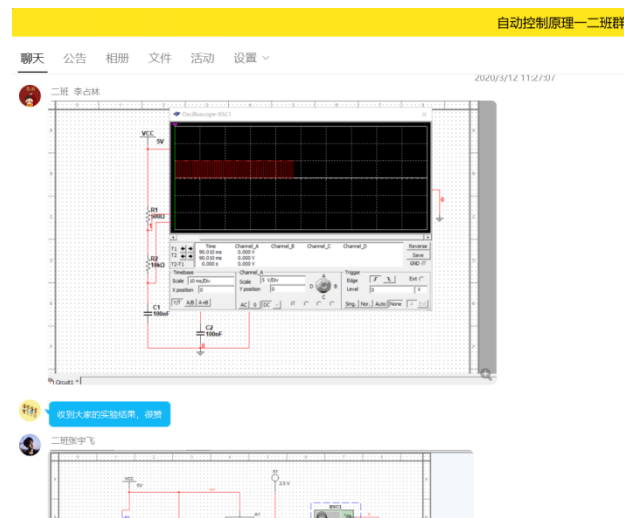


Figure 4. Online Experiment Training Record

After the continuous summary of the course group and the exchange of experience between the teachers in the teaching and research section meeting, I have already adapted to this teaching method with ease. After explaining the key and difficult content in this class, the teacher QQ group released a practice. For such a large calculation course, the teacher suggested that you can take multiple answers, after leaving questions for students in class, you can randomly select students 'practice completion, in so as to increase the students' interest in schoolwork. If it is a group of teachers and students, there are some good functions, can convenient to use, emphasize the teacher should be the administrator identity, for

homework information, can be corrected, even can use the red pen, at the same time for the problems of students targeted approval and modification, students can repeatedly submit to modify the answer after it. For class exercises, it is difficult to beat formulas. Students can write them out in their teaching notes and send pictures to the teacher. At the same time, teachers can timely publish the answers of exercises or homework in Tencent meetings and QQ groups, and they can also publish homework questions on the Superstar platform to summarize the students' understanding of knowledge points in each class.

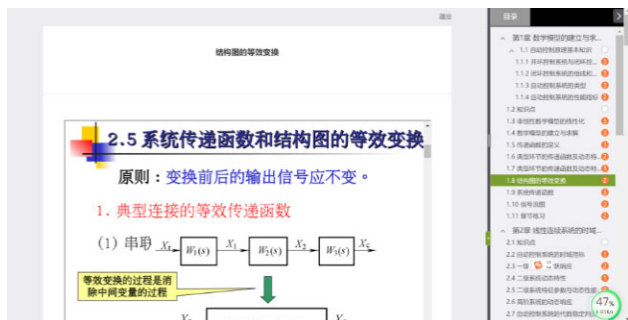


Figure 5. Online teaching resources

2.4. Consolidate the First Channel and Strengthen the Way of Information Dissemination

The information transmission methods between online teaching and offline face-to-face teaching have fundamental differences: offline teaching information is a multi-dimensional and all-round communication between both sides, while online teaching is a one-way transmission from teachers to students. At present, online teaching is mainly conducted with the help of Tencent Conference, QQ Group, cross-school platform supergroup sharing screen, and delivering course content knowledge through the first channel.

Video and audio information are an important part of the online classroom. Teachers are the first channel to convey information to students through online platform video teaching, which can strengthen the communication between teachers and students to a certain extent and improve the transmission efficiency of teaching content. However, although software such as Tencent Conference can show students' images, most of the computer screen is used for showing courseware, so it is difficult to take into account students' text and picture information of the course. Therefore, how to ensure the teaching effect, especially the real-time grasp of the students' listening status, is a problem that every teacher needs to think about during the online teaching period.

(1) Build a second channel across the platform to dynamically grasp the students' listening status in real time

In order to understand the status of students in real time, in the automatic control principle course, increase the number of computers, and open up the second channel to observe the status of students while teaching. Take Tencent Conference as an example. In class, teachers display the course content on the students' computer screen through the shared screen function. However, the screen projection function is the default screen projection interface, and it is difficult to take into account the student end boundary. Therefore, this teaching method is not suitable for observing the listening status of students. In contrast, QQ group video or Tencent software is more suitable for showing students' listening

status. However, due to the interface display limit, when too many students participate, it will cause login failure, computer terminal lag and other problems. After a lot of attempts, the teacher found that the whole class members (36~40 people) could be fully displayed in the computer interface by setting the number of each group to 9 or 25 people and registering multiple QQ numbers for video dialogue. Using this method, increase the number of computers and groups, you can expand the class capacity. Finally, the method of combining Tencent conference sharing and QQ group video was adopted, which not only took into account the information transmission of the teaching content, but also understood the listening status of students in real time, and achieved a good teaching effect. Through the second channel, teachers can observe each student's expression at any time, forming a good interaction. Before the class, the teacher organizes the students into groups, with 9 members in each group, with relatively fixed members, and explains the use methods and requirements of the online platform to the students. Since each group of interface can fully display the students' heads, the attendance situation is clear at a glance, and the efficiency of class roll call and questioning is greatly improved.

2.5. Innovate and Open Up the Third Channel to Effectively Ensure the Quality of Teaching

Due to the space-time limitation of online teaching, it is difficult for teachers to understand the students' feelings of listening to lectures in the teaching process, and it is difficult to grasp both the network screen projection and the audio effect, which indirectly reduces the teaching efficiency. Therefore, how teachers understand the effect of teaching and listening, has become the key to the quality of the classroom. In order to solve the above problems, by opening up a third channel, a new device (computer, Pad or mobile phone) is added to feel the audio-visual effect of online teaching from the perspective of students. By registering an account, log in to the teaching platform on the new device, and receive the online transmitted audio and video together with the students. Teachers should understand the effect of the screen projection and the lecture situation, grasp the classroom progress, and find out the problems in time.



Figure 6. Online teaching aids

3. Summary

Under the background of engineering education

professional certification, improve the achievement of curriculum teaching objectives. Take students as the center, improve students' autonomy. In order to realize the course teaching objectives, cultivate students' ability to independently expand the width of knowledge and deeply explore the classroom content, and adopt the way of classroom speech to increase the proportion of students' research work. In the process of multi-channel and dual-platform online teaching, students' execution ability is greatly improved, and each student has gained the opportunity to show their learning results and interact with teachers. The course content is adjusted and guided according to the students' performance, which realizes the student-centered teaching mode. Online teaching method through the platform

is conducive to improving the classroom quality, and it is more suitable for the requirements of curriculum reform of engineering education certification.

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