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Application of Project-driven Method in the Teaching Process of Electronic Practice Course

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Abstract

In the traditional practice class, it is the practice content and operation steps that teachers have drawn up in advance. The main task of practice students in class is to listen to the teacher's lectures, plug in the circuit according to the experimental instruction, verify the experiment, record the data, and complete the practice report. With the teacher as the main body, there is no more time for students to think and play. Therefore, students lack initiative, and this kind of practice process can't fully arouse students' enthusiasm and activity. Project-driven teaching method can fully arouse students' learning enthusiasm, and combine theoretical knowledge with teaching tasks to help students master corresponding theoretical knowledge while completing tasks and exercising practical ability. This teaching method has improved students' ability to practice engineering, solve practical problems, explore and innovate, and unite and cooperate, and achieved good teaching results.

Keywords

Electronic Practice; Project Driven; Teaching; Student.

1. Introduction

Practice is a professional skill course for electronic technology majors, which requires students to have solid and sufficient theoretical knowledge, master welding skills, judge and eliminate the faults of simple electronic products, understand the manufacturing process of electronic products, and master the relevant technological requirements in the manufacturing process of electronic products. At the same time, students are required to have the ability of analyzing and solving problems, autonomous learning, communication and teamwork. The learning contents covered by the electronic practice course include the identification of components, the installation and debugging of circuits and the testing of some basic unit circuits. In the traditional practice class, the practice content and operation steps have been worked out in advance by teachers. In practice class, students' main tasks are to listen to the teacher's lectures, plug in the lines according to the experimental instruction, verify the experiment, record data and complete the practice report. Teachers are the main body, and there is no more time for students to think and play. Therefore, students lack initiative and enthusiasm for participation. In the past, students operated on the experimental platform, and some of the experimental components were encapsulated in the experimental platform, so students had little chance to contact physical objects and lacked intuitive feelings. Each experimental content is set by combining analog electronic technology and digital electronic technology theory course, which is characterized by numerous and miscellaneous experiments, weak comprehensiveness, and insufficient experimental time in some parts, which makes students' ability unable to be comprehensively improved [1].

Therefore, we have carried out a series of reforms in the electronic practice course, focusing on the improvement of students' practical ability, learning interest and the cultivation of project-

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based thinking. We have changed the way of "teachers teaching and students' passive learning" into "students' active learning and teachers' guidance", taking project-based experiments as the carrier, so that students can form project-based thinking as soon as possible, and electronic technology experimental teaching can develop towards engineering and application. Taking the circuit design experiment of the responder as an example, this paper expounds the measures taken in the reform.

2. Teaching Design of Project Driven Teaching Method

Adjust and select representative experimental contents, give students more time to understand and master the whole experimental circuit design steps, and cultivate students' project-oriented thinking. On the premise of ensuring a lot of experimental contents, the teacher made a fusion. According to the textbook and certain social background, the teacher set a specific scene as the background, taught the necessary basic knowledge of project design and implementation, paved the way for knowledge, and led to the learned knowledge and practical projects. In the design of the project, the teacher puts forward several specific project tasks for students to choose from, and then decomposes each project task into knowledge and modules. At the same time, it also guides students to recall relevant knowledge, so as to establish the connection between project and knowledge, discuss with students, and encourage students to initiate consultation with teachers. Make a project plan. Under the guidance of teachers, students are divided into scientific groups. Within the group, students will determine the way of division of labor and cooperation according to the actual situation of the group and the strengths and weaknesses of the team members, clarify each person's task, and work out the project implementation process. To implement the project, students should carry out the actual project operation according to the preliminary preparation, and ask the teachers for help in time when they encounter problems, and the teachers will give targeted help and guidance. After the completion of the project, students will show and introduce the project results, summarize the problems encountered in practice, the solutions and shortcomings, etc., and give students sufficient display space. Teachers accept the project, make a guiding evaluation on the project results and working process, and systematically summarize the project results of each group. The extension of knowledge, this link is formulated by teachers for this project.

2.1. Experimental Equipment

Provide students with perfect experimental equipment and equipment. In order to enable students to fully grasp the knowledge they have learned and form project-based thinking, the experimental center of our school specially provides two laboratories for electronic technology experiments to carry out experimental teaching. Instead of the original two-person experimental platform, it provides each student with an experimental station and a set of experimental equipment. Provide computers for teachers' broadcast teaching on the workstation and download the latest versions of various EDA simulation software. Each student's seat is fixed and equipped with component box, bread board, toolbox, DC stabilized power supply, signal generator, oscilloscope, multimeter, welding table, etc [2].

2.2. Project Driven Teaching Method

After teaching the basic theoretical knowledge, the teacher will give the students questions, give the specific indicators of the experimental circuit, guide the students to simulate on the computer, and then ask the students to build the circuit independently on the bread board. Compared with the traditional teaching mode, it is better to let students participate in the production process "work" in person than to show them in pictures and videos in the classroom. The process of "project" in teaching is the process that students get in touch with what they have learned and know what they have learned. It is not only super intuitive, but also can

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improve students' adaptability to future jobs. In the traditional experiment class, because students don't preview or don't preview enough, it is often necessary for the experiment teacher to explain and demonstrate, and then the students complete the circuit connection in the experiment box or on the experiment platform. This experimental process can't fully arouse students' enthusiasm and activity. At the same time, because the experimental teaching content is not all the links in the actual project, it lacks the simulation design part and the subsequent circuit board design, manufacture, debugging and other links. Therefore, it is necessary to increase practical teaching links to further cultivate students' engineering application ability and innovation ability.

Aiming at the disadvantages of traditional teaching method and electronic technology teaching, such as insufficient professional matching, unobvious teaching effect and unobtrusive teaching results. In the project-driven method, learners can practice in groups according to the "project tasks" given by teachers. Each team member has to undertake a part of the task, and when the project task is finished, a work with detailed functions can be obtained. In the whole production process, all the staff participated, the division of labor was reasonable, and the team spirit and organizational ability of the team members were fully exercised, and the enthusiasm of all the members was fully stimulated, which provided a guarantee for the improvement of teaching effect and the improvement of learners' comprehensive ability. Project-driven teaching method pays attention to learners' learning enthusiasm and autonomy, the planning of learning tasks, the integrity of learning links, and the situational situation that adapts to the learning content. Project-driven teaching method is one of many teaching methods in action-oriented teaching theory. Its ability to play a real role in professional skill promotion is due to the integration of universal functional education objectives into the whole teaching process, which realizes the organic combination of ability training and skill promotion.

3. Teaching Cases

3.1. Task Layout

The teaching design of the project is mainly based on the teaching material content and application practice. In many typical projects, according to the existing knowledge level and learning interest of the group of students, the project of this project teaching practice is finally designated as "NE555 composed intermittent ringing circuit". Through theoretical teaching, teachers explain the theoretical knowledge related to analog circuits and digital circuits. Teach the usage of NE555 chip, triode, buzzer, simulation software, the usage of required DC regulated power supply and other experimental equipment and matters needing attention. Practical tasks are arranged in the form of projects, and students need to consult the relevant manuals for the specific purpose and usage of each device. Because the experimental method is closer to the actual production, this process requires students to consult a large number of materials, which improves their practical ability.

After receiving the task, the students will analyze the principle and implementation method of the circuit according to the theoretical knowledge they have learned, then decompose the design steps of the circuit, draw the circuit diagram, and conduct simulation experiments on the computer. If the students complete the simulation and the result is correct, the teacher will register according to the completion ranking, and then the students will receive the components from the teacher for circuit plug-in according to their own list of components. Students can also use their spare time after class to conduct experiments in an open laboratory. Compared with the past, students have more experimental time, more space for thinking and playing, and their interest and enthusiasm in experiments have also been improved.

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3.2. Software Simulation and Component Selection

In this stage, students are familiar with EDA software, verify their designed circuits and receive related components. In order to get the simulation results, students should first learn the basic usage methods of EDA software, such as building engineering, drawing schematic diagram, setting parameters, compiling simulation, running result analysis, etc. Only by going through this process in person, after many times of compilation and simulation, can students get the correct results and analyze them. Teachers will check the progress of students' drawing and simulation in the laboratory, and answer questions for students who have doubts about simulation. Check and accept the simulation circuit and results of intermittent ringing circuit composed by teacher and student NE555, as shown in Figure 1. If the simulation result is correct, the teacher will register the finished ranking and score according to the simulation quality. Students who have finished will receive an experimental box from the teacher, which contains basic tools such as universal circuit board, tweezers, pliers, soldering iron, etc. The experimental box has a student information label, which is convenient for later retrieval and reuse. Students can also select components according to the list of intermittent ringing circuits to prepare for the next step of plugging in the bread board. Students keep these components themselves, and some of them will be taken back after the experiment. If there are students who have not finished the simulation at this stage, they can use their spare time to continue the simulation in the laboratory.

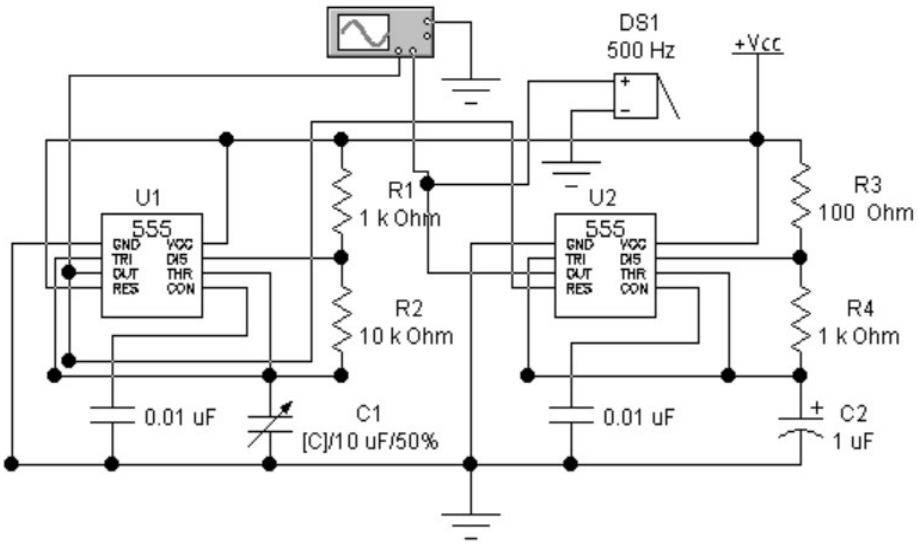

Figure 1. Simulation circuit diagram of intermittent ringing circuit

3.3. Circuit Board Construction and Completion Test Report

Students plug in the module circuit in units, complete the lapping and testing of the whole intermittent ringing circuit, and complete the experimental report after class. At the end of the simulation and after receiving the components, first, the teacher explained the matters needing attention in the use of the universal circuit board in class, such as the arrangement position of the components on the universal circuit board, the selection of the wire length and the avoidance of "crossing lines" [3].

At the end of the overall test, the teacher will check and accept the students' circuits. During the check and acceptance stage, the students will demonstrate themselves to see if the circuits can make a normal ringing sound. If there is no problem, the teacher will register the students and grade them according to such factors as whether the circuit arrangement is reasonable and whether the wiring is neat. As the experimental boxes and components can be carried by students. If the class is not finished, students can still lap after class or continue to do

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experiments in the open laboratory. After the experiment, students need to complete the report book, answer questions, summarize the design and analysis method of the station number display circuit, and summarize the working principle of intermittent ringing circuit. After completing the report book, the students reviewed and summarized the principle and experimental process of intermittent ringing circuit again. Finally, the teacher graded the quality through the student report book.

4. Conclusion

The reform and practice of electronic technology experiment aiming at the design project enables students to enter the learning and training stage of combining theory with engineering practice in advance, arouses their desire for innovation and creation, and has the ability to enter the independent design space. Students have basically gone through the process of familiarity with experimental instruments, circuit principle analysis and design, component selection, circuit simulation and testing, and building universal circuit board. Through practice reform, students have enough time to complete each step. The selection of practical content is closer to engineering practice, and with complete experimental instruments, students gradually change from passive learning to active learning, which improves students' experimental interest, hands-on and innovative ability, and cultivates students' engineering application ability.

Acknowledgments

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