

Teaching Reform and Research of Electrical Control Technology Training Course based on OBE Concept

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Abstract

"Electrical Control Technology Training" is a required course for electrical engineering specialty, the course is practical, the traditional teaching mode cannot reach the ideal teaching effect. Based on the teaching concept of OBE, this paper studies and discusses the existing problems and solutions in the course of Electrical Control Technology from the aspects of education concept, teaching mode, curriculum structure and evaluation system.

Keywords

Electrical Control Technology; The Teaching Reform.

1. Research Significance

"Electrical Control Technology Training" is a required course for electrical automation major, which can improve students' professional quality and professional ability through practical training, and is an important course to combine theory with practice. Its specific content includes the function, principle, structure and installation method of common low-voltage electrical apparatus; Three-phase AC induction motor typical electrical control circuit principle, assembly, debugging, etc. This practical course is the basic practice of electrical engineering and automation major. It is the knowledge that students must master, and it requires design ability. Through practical training, students can apply the traditional relay programming and realize the control ability. And train students to use the theoretical knowledge have learned the ability to analyze, solve practical problems and practical ability and access to data. It is a comprehensive test of the cultivation effect of students' quality and engineering practice ability. PLC design is an important basis for students; it is an important evaluation content to measure the quality of education.

The learning focus of this course is to master the installation and debugging of common electrical control lines, and on this basis, let students master the method of troubleshooting electrical lines. However, due to the large number of classes, there are some problems in the circuit function test and troubleshooting, which are mainly reflected in the following three aspects. Classroom efficiency is reduced, there are security risks; relying on teachers' guidance to find problems, students lack active learning consciousness; the process evaluation index is single, and the installation process lacks effective guidance. At the same time, because of the traditional teaching mode, not only make students unable to master its main content, but also make the course content and enterprise production practice disconnection, therefore, the reform of electrical control technology practice course content is imperative.

2. Application Prospect

In the process of teaching implementation, compared with similar courses in domestic schools of the same level, this series of courses and practical content has its unique advantages.

Advantage 1: educational concept

As the educational concept of the course is ahead of its time, its teaching mode, teaching methods, teaching means and teaching resources have been innovated.

Advantage 2: teaching mode

Adopting modular teaching mode, teaching design and organization are carried out module by module.

Advantage 3: curriculum structure and evaluation core system

By simulating the real working environment of the enterprise, students can participate in the working process themselves, so as to learn and master the knowledge and skills associated with the working process.

The professional knowledge and skills involved in electrical control technology are in demand in many industries, such as production field, construction field, medical field, etc., which plays an important role in improving students' professional quality and professional ability. At present, there are a total of 866 students in our electrical major, including 280 students of grade 20. The number of students keeps growing, and the course "Electrical Control Technology Practical Training" has a broad application prospect.

3. Status Analysis

Electrical Control Technology Training is a professional basic course for electrical majors. As a practical course, students can intuitively understand the structure and function of electrical components and further understand the working principle of electrical control circuits through installation and debugging of electrical control circuits. At present, the practical training projects are generally outdated with too low or too high difficulty, which cannot reflect the essence of the classical electrical control system in the later teaching process. As a result, students' practical ability and learning interest will be reduced, and the learning effect will not reach the expected goal. In addition, the study focus of this course is to master the installation and debugging of common electrical control lines, and on this basis, let students master the method of troubleshooting electrical lines. However, due to the large number of classes, in the circuit function test and troubleshooting links, the equipment is too old and the limited number of practical teaching brought some problems. The comprehensive electric cabinet adopts 380V three-phase AC power, which is quite dangerous in the practical training set up in colleges and universities. How to ensure the safety of electricity in the practical training has become the top priority in the practical training teaching. How to ensure the standardization of wiring electrical control training requires students to wire, how to ensure the standardization of wiring for students, and how to make the wiring standard, reasonable and effective, have become the content that needs to be focused on in the training process.

3.1. The Status and Existing Problems of the Curriculum before the Reform

3.1.1. The Training Content is Outdated and Students are not Interested in Learning

As a practical training course, appropriate practical training projects can improve students' interest in learning and enable students to master professional knowledge step by step. Students to learn the courses of electrical control and have no interest in higher, although the blend in the innovation entrepreneurship education idea in the teaching activities of the electrical control, comprehensive practical course teaching is changed, but because of the discipline nature remains the same, students learning situation is not effectively improve, it's for innovation entrepreneurship education concept and electrical control of education more serious test is proposed.

3.1.2. Disconnection between Teaching and Production

At present, the teaching content of this course is mainly the verification of textbook knowledge, without the integration of classroom teaching and production practice, leading to the

disconnection between the knowledge required by students after graduation and the reality, which is not conducive to the development of students' career, which is also an urgent problem to be solved by applied colleges and universities.

3.1.3. High Failure Rate of Equipment and Lack of Safety Education

Due to the frequent use of various switching devices, contactors, relays and so on in the training process, students' operation level is limited, and the equipment is too old and traditional, resulting in a high failure rate of devices and equipment, thus affecting the teaching effect. Electrical equipment safety education is also relatively lacking, often appear electrical equipment short circuit and other faults, improper human operation may also cause life and property safety accidents.

3.1.4. Low Teaching Efficiency

Teachers can only test the circuits that students have done well, and lack the basis of process evaluation, resulting in a single evaluation index. According to the overall situation, the teacher roughly judged the class students' knowledge mastery, which was one-sided and could not have a deep understanding of each student's problems in the learning process of the project. Such classroom teaching cannot really achieve the teaching goal of "let every student master the method of circuit installation and debugging", in the classroom teaching cannot achieve effective guidance for each student, the implementation of individualized teaching.

3.2. Reform Measures to be Taken in Response to the Above Problems

3.2.1. Strengthen Students' Awareness of Safe Operation and Eliminate Potential Safety Hazards of Training Equipment

With the traditional training equipment used in this course, students may switch on the power supply without permission in the case of serious circuit errors, resulting in short circuit faults, damaged components and hidden dangers to personal safety. In order to improve the safety of electrical training teaching process and eliminate the potential safety hazards of training equipment, the installation panel of training equipment is replaced and software control is integrated to create safe and efficient intelligent training equipment.

3.2.2. Optimize the Training Content and Integrate Teaching Resources

Aiming at the course "Electrical Control Technology Training", on the basis of the specific hardware conditions of electrical training laboratory and programmable controller laboratory, the training content is optimized, the training instructions are rewritten, and several typical enterprise module control circuits are selected as training projects for each module. On the basis of basic experiments, let students design lathes and drilling machines and other electrical control circuits by themselves by assigning tasks to stimulate students' innovation ability. The experiment process should be gradual and orderly. For students of different majors, targeted selection of professional characteristics of the practical training projects, improve learning interest.

3.2.3. Pay Attention to Practical Training Details, Improve the Teaching Effect

In the actual teaching project, in addition to teaching students how to build circuits and programming debugging, but also pay attention to the grasp of details. For example, in the training of power distribution cabinet wiring, besides the correctness of wiring, we should pay attention to beauty. Distinguish the color of phase line and grounding line, go straight, the rationality of wiring, accurate use of line slot buckle plate and other details can help students to standardize operation, develop good professional habits, thereby increasing the self-confidence of learning. Through continuous improvement in all aspects, finally achieve good teaching effect.

3.2.4. Construct the Evaluation System of Practical Training Operation -- Integrate Ideological and Political Elements

After students complete the practical training, the assessment content reflecting ideological and political elements is incorporated into the course process evaluation and final evaluation, and the integration path of professional basic practice courses and ideological and political education is explored, so as to cultivate the craftsman spirit of striving for perfection and improve students' professional quality.

3.3. Main Aspects of Teaching Reform

This teaching reform mainly aims at the following aspects:

3.3.1. Clear Course Objectives

According to the school positioning, personnel training objectives and enterprise needs, determine the curriculum objectives.

3.3.2. Update the Teaching Content

According to the actual needs of quality, ability, knowledge requirements, to select the teaching content.

3.3.3. Adopt a New Design Concept -OBE Teaching Concept

Through the integration of information technology and Internet of things technology, the original training equipment design is transformed into intelligent training equipment, and the concept of automatic detection is integrated to improve the teaching efficiency of training courses. It meets the teaching needs of the course "Electrical Control Technology Training" and improves the teaching effect.

3.3.4. Compiling Supporting Textbooks

Prepare supporting outline and instruction book for teaching reform.

4. Summary

In the course of "Electrical Control Technology Training" based on OBE concept, students can intuitively understand the combination of electrical control and PLC technology through task learning, so as to improve students' comprehensive vocational quality and employment competitiveness.

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