Application of Case Teaching in PLC Teaching

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ABSTRACT

In view of the current goal of cultivating applied talents, the undergraduate application, the reform of curriculum in higher vocational colleges, and exploring different ways to improve the current teaching mode. The PLC course is a professional basic course, strong theoretical and practical, The traditional teaching methods in the past difficult to adapt to the current requirements of personnel training, to explore suitable for new teaching methods is necessary. In this paper, the case teaching as the starting point, according to the students' cognitive ability, the development of case projects, fundamentally solve the practical skills of students, broaden the students' knowledge, to cultivate market demand for applied engineering and technical personnel.

Keywords: case teaching method, teaching content

Programmable controller (PLC) is a new type of general automatic control device which integrates computer, automation control technology and communication technology. It has the advantages of strong function, high reliability, flexible operation, simple programming and suitable for industrial environment. A series of advantages, has been widely used in industrial automation, process control, electromechanical integration, traditional industrial technological transformation and so on, and has become one of the three major supports of modern industrial control. It is a professional and compulsory course of electrical and automatic specialty. Due to its

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particularity, comprehensiveness and practicability, it is feasible to use case teaching to meet the needs of applied talents and the characteristics of less time in local colleges and universities.

The Present Situation of PLC Course Teaching. The traditional classroom lectures are full of teaching methods, students are passive rote instructions, using chalk + blackboard mode to lecture, classroom learning atmosphere, poor activity, students learning objectives, initiative is not clear. Teacher in the classroom is the speaker, in the process of solving the problem of their own problems, to solve the problem, the students just accept, mechanical back, not the master of the classroom, classroom participation is not high, the entire teaching process is based on teachers, did not fully mobilize the enthusiasm of students. PLC course teaching content is more abstract, the students need a higher logical thinking, and case teaching so that students must follow the teacher's teaching ideas on the one hand, on the other hand to have their own views, not only that the teacher is the standard answer, to have their own ideas and solutions to the full play to their own creativity and learning initiative. It will not graduate to participate in the work, although the study of the PLC course, to the actual operation I do not know where to start, is to understand the instructions but can not be integrated, to be aware of its reason.

Case teaching refers to the application of the case to the teaching, through the teacher to teach the basic knowledge, ask questions, organize students to discuss, write case analysis report and other processes to achieve the purpose of teaching, improve teaching effectiveness, so as to improve the level of theoretical knowledge of students and solve practical problems Teaching methods [1]. Case teaching is actually to achieve the integration of theory and practice, through the heuristic teaching, so that students become the master of the classroom, the students placed on the subject of learning in the teaching process boldly asked to ask, do not bear in mind the teacher content, you can start thinking, not to be explained by the teacher and the constraints of teaching materials, effectively improve the problem, analyze the problem, the ability to deal with problems, so as to cultivate students' creative ability and innovative spirit.

PLC case teaching process. First, the choice of cases to consider the outline of teachers and training objectives, the case design to cover the knowledge points, while paying attention to the integrity of knowledge points. The design of the case can be decomposed into modular, and then modular combination, from small modules to understand the knowledge points, so that the complex knowledge into a concrete, reduce the difficulty, so that students can accept, learn the interest and enthusiasm to be improve. In the implementation process, the teacher throughout the guidance, the main body
of students, usually: teachers to assign tasks; students access to relevant information and team to develop the initial program; teachers in accordance with the student program to guide the development of solutions and steps; group according to the views of teachers grouping, division of labor, to the content of the solution; the group to report and demonstrate their own results; by teachers and students to form a defense group to evaluate the case, while the summary is mainly on the group members to discuss not deep enough, do not understand the place, Do the focus of evaluation, the teacher summed up the case evaluation, those who need to improve, to be just right. PLC technology case teaching arrangements:

**PLC case teaching arrangement.**

| Project                  | Case analysis                                                                 | Case task                                                                 |
|--------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Motor long control circuit | 1. Commonly used low-voltage electrical use                                  | 1. The main circuit of the motor running in one direction.                 |
|                          | 2. Basic control of the motor circuit works                                 | 2. Motor single-direction operation of the control circuit                 |
| Motor reversing control circuit | 1. Commonly used low-voltage electrical use                                 | 1. The main circuit of the motor running in both directions               |
|                          | 2. Low-voltage electrical design circuit ideas and methods                   | 2. Motor two-way operation of the control circuit                         |
|                          | 3. The most basic control of the motor circuit works                         |                                                                           |
| Motor Y - ▲ step-down control circuit | 1. Commonly used low-voltage electrical use                                 | 1. Motor Y - ▲ step-down start of the main circuit                       |
|                          | 2. Design ideas and methods for designing circuits with low-voltage electrical appliances | 2. Motor Y - ▲ step-down start control circuit                             |
|                          | 3. The most basic control of the motor circuit works                         |                                                                           |
| Start - hold - stop, motor | 1. PLC basic instructions and simple programming methods                    | 1. PLC basic instructions function and application                        |
forward and reverse control, PLC timer application

2. Use the Mitsubishi software input program
3. Use the PLC control cabinet to verify the program
4. PLC control cabinet use, the correct wiring, the correct operation

1. PLC basic instruction and application programming method
2. Use the PLC to design an application that has a certain function
3. Proficiency in using the PLC control cabinet to verify the application
4. PLC control cabinet use, the correct wiring, the correct operation

PLC control response device design
PLC control traffic light design
PLC control day tower light design
PLC control digital tube design
Design of water level design of water tower

1. PLC basic instructions function and application
2. PLC programming of the basic instructions and the use of the programming elements
3. The correct use of Mitsubishi software and the input of the program
4. PLC control cabinet use, the correct wiring, the correct operation

A complete PLC application system design of the main steps: familiar with the controlled object of the process, analysis and control requirements; according to functional requirements to determine the I / O equipment; PLC hardware system configuration; allocation of I / O points; design applications; debugging procedures; online debugging; preparation of technical documents.

Case teaching to make classroom interaction, mutual atmosphere more active, because the PLC course case teaching design is no fixed answer, students can boldly questioned, bold to assume that their own ideas, can be justified, should be encouraged. Case teaching in the whole process of teaching students enthusiasm, initiative is greatly improved, practical ability to be improved, through the group discussion, the students before the more integration of the spirit of teamwork. In short, case teaching plays a certain role in imparting knowledge, which is one of the better ways of modern teaching.
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