World Journal of Educational Research
ISSN 2375-9771 (Print) ISSN 2333-5998 (Online)
Vol. 11, No. 5, 2024
www.scholink.org/ojs/index.php/wjer

Original Paper

Teaching Reform and Research on Programmable Control Technology Course Based on Virtual Simulation Technology

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Received: July 22, 2024 Accepted: September 08, 2024 Online Published: September 29, 2024

doi:10.22158/wjer.v11n5p43 URL: http://dx.doi.org/10.22158/wjer.v11n5p43

Abstract

Accompanied by the continuous development of the modern education model of the Internet, and at the same time, in order to cope with the cultivation needs of the new engineering applied talents, the teaching of the programmable control technology course is combined with and virtual simulation technology to carry out the corresponding theoretical teaching and experimental courses.It can not only present the abstract theoretical knowledge of the course and the control process vividly and concretely in the form of animation to stimulate students' learning motivation and interest, but also solve the experimental teaching problems such as shortage of experimental equipment resources and insufficient experimental space area. Teaching practice shows that the teaching reform has improved students' independent learning ability to a certain extent, cultivated students' independent thinking and engineering practice application ability, and provided a reference for the cultivation of applied talents under the background of new engineering discipline.

Keywords

Virtual simulation technology, applied, Programmable control technology, teaching reform

1. Introduction

As an applied university, the goal of its talent training is to cultivate comprehensive talents with certain professional skills, with certain hands-on practice and the ability to solve engineering problems. Traditional theoretical teaching simply can not meet the training requirements, especially for courses that require high practical ability. Virtual simulation technology is one of the teaching means to change the traditional, the introduction of virtual simulation technology in the classroom is conducive to improving students' learning interest; at the same time, under the background mode of interconnected + teaching and online, offline mixed teaching, it is easier to be accepted by college students in the new era, and it has a better teaching effect. Therefore, under the new engineering background of higher

education in the new era, keeping up with the pace of the times, applying new technologies to the classroom teaching of programmable control technology can strengthen the students' theoretical knowledge, improve their hands-on practice and problem-solving ability, and make it easier for students to master this course.

2. Current Status of Course Instruction

Programmable controller as the key equipment in the automatic control system, in industrial production and life is more widely used. The course is a practical and difficult course, a combination of computer technology, communication technology, automatic control technology and other related knowledge; the degree of mastery of the basic knowledge of the students requires a high degree, while the modern industrial control basically can not be separated from the PLC programming, such as metallurgy, chemical industry, electric power and other fields. Programmable control technology course for electromechanical students, the status of the new engineering education model in the context of the position is very important, not only need students to firmly grasp the basic theoretical knowledge, but also emphasize the application of students' theoretical linkage to the practical ability. The main problems in the current teaching process are as follows:

2.1 Separation of Theory and Engineering Practice, Lack of Practice

In the general teaching process of the course, emphasis is placed on the explanation of the theoretical knowledge of the course, and there is a lack of practicality and project demonstration. For example, the lack of specific practical use in the learning process of programming instructions, the lack of connectivity with the project practice, a single instruction can be applied, combined with other instructions may be problematic, the teaching effect is generally poor.

2.2 Lack of Experimental Training Conditions for the Course

In the course of the experimental teaching process, there are generally more people in the class, the experimental equipment is not enough, the teaching practice of a single type of resources and other problems, unable to meet the diversified teaching needs of the course. Students in the experimental process is basically through the group with the help of practical training pendant, complete the design, wiring and programming exercises, although a certain degree of exercise in the hands-on ability of the students, but most of the students are still cloudy, simply do not want to operate why so. In the final analysis, students lack of interest, the experimental program can not keep up with the current social and technological issues hot, lack of novelty.

2.3 Students' Lack of Motivation and Enthusiasm for Learning

In the teaching process, it is found that some students have problems such as insufficient cognition of the course and weak professional basic knowledge in the preliminary reserve, and they are afraid of the course, which leads to low motivation for learning. At the same time, the lack of understanding and thinking about the current engineering employment environment, job requirements, and future employment direction indirectly leads to confusion and lack of motivation in the learning stage.

3. Course Teaching Reform Content and Methods

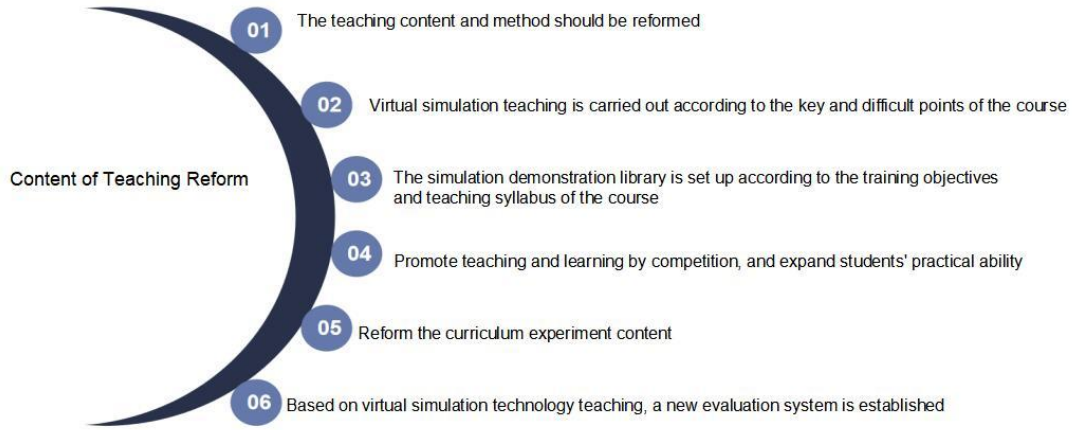

Figure 1. Content of Teaching Reform

Teaching reform of programmable control technology course based on virtual simulation technology, comprehensive consideration should be based on the characteristics of the course and specialty, to meet the needs of the training of applied talents, so that they have a certain working ability in the corresponding jobs of electromechanical specialties. At the same time, in accordance with the basic requirements of the curriculum reform, follow the law of student development, integration and optimization of teaching resources, the use of virtual simulation teaching advantages, to achieve the teaching, learning and doing of the trinity, the content of its teaching reform as shown in Figure 1:

3.1 Reform the Teaching Content and Methodology by Combining Informatization Teaching and Curriculum Training Needs

According to the needs of students and classroom learning effect, the investigation and analysis of students to facilitate the understanding of the learning difficulties and pain points of students on the course, in-depth understanding of the students' basic knowledge of the profession, the mastery of the preparatory knowledge. Based on the survey analysis, the course content modular disassembly, the course difficulties, key content and students do not grasp the basic knowledge of the place, the use of a variety of teaching methods, different perspectives to explain and analyze, and strive to students to grasp the theoretical knowledge of the course firmly.

3.2 Based on Simulation Software, Build the Course Virtual Simulation Teaching Mode

Based on the virtual simulation software, the course content is modularized and decomposed, and the abstract and difficult-to-understand parts of the theoretical knowledge of the course are simulated with the help of the simulation software and explained in the form of animation. For different modules of knowledge content, especially instruction programming-related content and experimental part of the content, with the help of virtual simulation software on the content of the image, vivid, specific scenario simulation, such as shown in Figure 2.

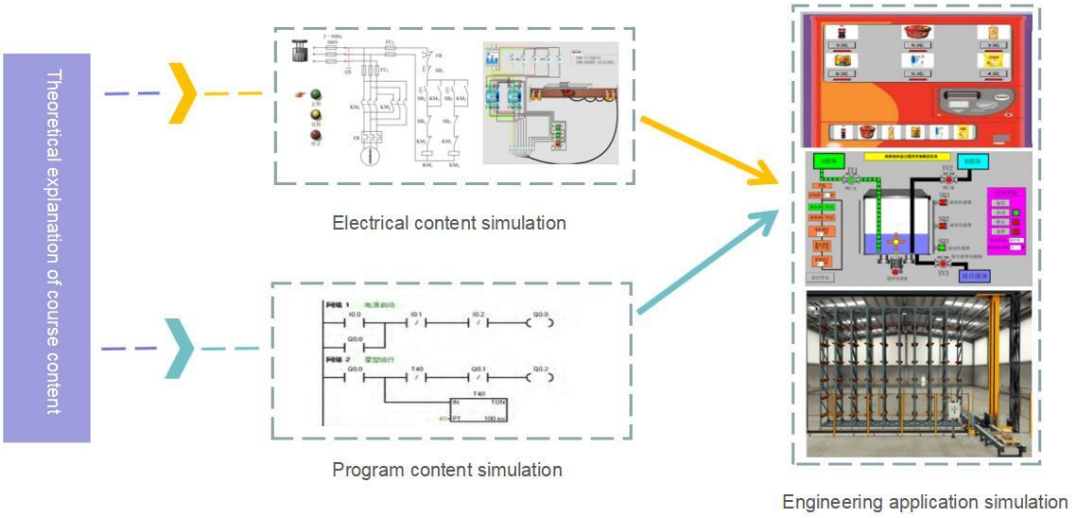

Figure 2. Course Simulation Teaching Examples

3.3 Establish a Simulation Demonstration Library by Combining the Course Training Objectives and Teaching Syllabus

For different learning content, under the limited teaching equipment and conditions, select the appropriate simulation software. Combined with the course content, progress and student interest, the establishment of the program simulation demonstration library in line with the content of the course, to facilitate students to understand and apply the content of the course, while students follow the work, expanding the ability of students to use the software.

3.4 Combining Da Chong and other College Discipline Competition Programs to Expand Students' Practical Ability

The cultivation objective of this course is not only to cultivate students with rich and solid professional knowledge, but also with strong hands-on ability; through the study of this course, students can have the ability to design and program according to the requirements and characteristics of engineering projects. Encourage students to actively participate in the Da Chong project, discipline competition projects and related scientific research projects, apply what they have learned to practical projects, expand their thinking and vision, and enhance their innovative thinking and independent thinking and problem solving ability.

3.5 Reform the Experimental Content of the Course in Response to the Conditions of the Experimental Equipment

With the help of virtual simulation software, the problem of insufficient experimental equipment is solved, which greatly saves the time of the experimental course; at the same time, it reduces the problem of damage to the instruments and equipment caused by improper operation in the experimental process. After considering the existing knowledge and ability level of students, students are grouped into experimental groups. The tasks, objectives and requirements of the project are set for each group, and students in each group are urged to collaborate with each other in designing and operating the

project, and to complete the project tasks within the specified time.

3.6 Teaching based on Virtual Simulation Technology, Establishing a new Assessment and Evaluation System

In order to improve students' attention to the learning of this course, their motivation and the quality of their learning, the implementation program of course assessment is further improved. The content of the assessment is guaranteed to correspond to the course syllabus, the evaluation criteria are clear and feasible, there are clear evaluation criteria, it is not a mere formality, and a diversified assessment method is adopted, which is able to measure the growth and progress of the students and the degree of achievement of the course objectives well.

4. Conclusion

The teaching of programmable control technology course, by combining virtual simulation technology and other means, the course teaching realizes a series of advantages such as richer content, higher efficiency, safer experiments, etc., and achieves the integration of teaching, learning and doing. It is conducive to students' better understanding and mastery of the theoretical knowledge of the course, and improves students' motivation and learning enjoyment; at the same time, it combines the programming of the course with real cases, improves students' sense of real operation, and stimulates their engineering application ability and innovation ability.

Acknowledgments

Higher Education Teaching Reform Program at Tarim University, Project Number:TDGJYB2313.

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