

Teaching Research of STM32 MCU Course under "New Engineering"

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Abstract

This paper mainly analyzes the current situation of STM32 MCU Course under "New Engineering", and describes many deficiencies in the teaching process of the current course. This paper mainly describes the further implementation and improvement measures of project teaching in STM32 MCU course in our school. This paper emphasizes the application of learning to practice and the application ability of single-chip computer development technology in practical projects. The course content design takes subprojects as its unit, and the teaching process centers on three main links: project analysis, project design and project implementation. The student-centered teaching concept is implemented throughout the course. On the basis of subproject design, considering the progressive difficulty of content, selecting projects are all practical cases closely related to daily life.

Keywords

MCU; Project Teaching; Teaching Research.

1. Introduction

"New Engineering" emphasizes the practicability, intersectionality and comprehensiveness of disciplines, with particular emphasis on the close integration of new technologies such as information communication, electronic control, and software design with traditional industrial technologies. The MCU interface and technology course, as a public basic course for the majors of electronic information, communication engineering, automation, electrical appliances and automation, covers the common knowledge points of various disciplines. It focuses on the close integration of hardware design and software design, and integrates Huawei ICT related technologies. Lays a good foundation for students.

This major aims to cultivate those who adapt to the development of communication technology and the needs of the industry and the development of the information economy in Liaoning Province, adopting the school-enterprise integration enrollment model, and companies formulating talent demand plans, including the number of talents required, job skills requirements, etc., according to the company's Information to develop enrollment plans. Using the Huawei ICT Academy, Huawei Data Communication Laboratory, and Switching and Mobile Communication Laboratory jointly established by our school and Huawei Technologies Co., Ltd. as the carrier, we deeply practice school-enterprise collaboration, engineering-learning alternation, integration of theory and practice, integration of learning and application, and modern apprenticeship. The system of education mode, implements "order, customization, and orientation" talent training, focusing on training high-quality skilled talents in communication technology under the background of communication engineering.

The MCU course is an important major course for the specialties of electronic information engineering and communication engineering. It is theoretical, comprehensive and practical. But it is also a course that students have been reflecting more difficult. This is a representative course of this specialty. This topic mainly takes the reform of the teaching methods of this

specialty as an example to study the teaching methods of this specialty, and to make a demonstration for the reform of the teaching methods of other specialty courses.

The reform of teaching methods is a systematic project, which needs to be improved and modified on the basis of retaining the advantages of traditional teaching methods and the training objectives of this specialty. This project combines the teaching of traditional theories with ICT technology, and combines with the training objectives, teaching plans, course groups of electronic information engineering specialty (automatic identification of technical specialty direction), communication engineering specialty. Teachers training, experimental practice system, evaluation methods and means, teaching methods and quality control system are all-round conceived and designed, and the teaching concept, teaching ideas, teaching methods, teaching evaluation and other aspects are reformed. The course of single-chip computer is built to be closely combined with ICT technology, and the project teaching method is used as the basis for the reform and meets the training objectives of our college.

The goal of this project is to drive the teaching reform of the single-chip computer specialty course with the actual project, form a complete set of teaching reform demonstration methods combined with the training goal, and then promote the course within the professional course system, so as to promote the construction of electronic information engineering specialty (automatic identification of technical specialty direction) and communication engineering.

2. Existing Problems

In order to meet the ever-changing development and application of science and technology as the basis of employment needs, the State Ministry of Education has placed the training of engineering practice ability of college students first in the training of Engineering talents. Each university is carrying out teaching reform in accordance with its current form. However, the methods and approaches are different. In view of the current situation of teaching reform, there are the following categories:

(1) The teaching reform is only a simple integration of the contents of the courses: most of the teaching reform of this kind of courses is due to the huge system of colleges and universities, which makes the reform difficult. Often a teaching model has been formed for decades. Both teachers and school leaders lack the courage and determination to reform. The teaching reform only stays in the reduction of the course content, reducing the theoretical hours, and freeing up one or two semesters for students to enter enterprises and other employing units. This kind of teaching reform is still out of line with the theory and practice, and no suitable point has been found.

(2) The teaching reform is a simple hierarchical teaching: in the teaching reform of such courses, many colleges and universities interpret the project teaching reform as elite teaching. Train a small number of students for postgraduate entrance examination, or instruct a small number of students to participate in various competitions. This approach does not take into account the majority of students and can be regarded as incomplete teaching reform.

(3) The main content of teaching is theory, but the practice is insufficient: In the construction of excellent courses at many national and provincial levels, we can see that many courses mainly focus on theory and do not attach importance to practical links. For example, the practice hours are insufficient, the content is only "plug-and-drop" validation experiment. Students feel disconnected from theory and application, dull in sensory theory and lack of practice.

The above three situations cannot be called complete teaching reform. In order to train a large number of high-quality engineering and technical personnel with strong innovative ability and meet the needs of economic and social development, this project is dedicated to innovating the teaching methods of professional courses. With the teaching reform of single-chip computer as

an example, the ICT technology teaching mode is introduced into the teaching reform of single-chip computer courses. To achieve the project-driven teaching, which deeply integrates theory with practice, focus on the training programs and methods of combining students' theory with practical ability, so that students can truly achieve the integration of theory with practice. Improve the teaching effect and quality of courses, improve students' innovative ability and practical ability to achieve the goal of training high-quality applied undergraduate talents, and provide strong talent support for the economic and social development of Liaoning, especially for the overall revitalization of Liaoning's old industrial base and the construction of a new Liaoning with prosperity, civilization and happiness.

3. Implementation Process

Attention should be paid to the application of modern educational concepts such as heuristic learning, exploratory learning and collaborative learning in teaching. Ability to design teaching methods and evaluation according to the course content and student characteristics.

According to OBE concept, teaching contents and methods should be designed in reverse according to teaching objectives, traditional pure theory teaching mode should be changed in the teaching process, knowledge points should be explained with project cases, and corresponding comprehensive cases should be designed in each chapter to bring up corresponding knowledge points in the form of project case requirements. In the process of project completion, master the abstract theory of single-chip computer control system, integrate the abstract concepts taught into the process of solving the designed comprehensive project cases, and cooperate with the experimental box to observe the actual phenomenon of project cases. With this project-driven approach, new teaching methods such as teaching interaction and classroom flip can be used to stimulate students' interest and motivation in learning, build up students' enthusiasm for self-study, and improve teaching results.

In small classes, students have more space and time to show their ideas in project analysis, project design and project implementation. Students have a higher degree of participation, which fully reflects the student-centered teaching concept. Students' learning effect feedback in class is timely. Teachers can complete the project tasks according to the students. Adjust course progress and homework schedule in time.

Emphasize the application of new technology in teaching and the reform of teaching methods; Flexible use of various appropriate teaching methods, effectively mobilize students to actively participate in learning, and promote students to think positively; Strengthen practice links to promote the development of students' innovative ability. Emphasize the application of new technology in teaching and the reform of teaching methods; Flexible use of various appropriate teaching methods, effectively mobilize students to actively participate in learning, and promote students to think positively; Strengthen practice links to promote the development of students' innovative ability.

(1) Optimize teaching content: based on excellent teaching materials, always adhere to the background of the entire single-chip computer system, and teach each chapter as a link of the single-chip computer system, realize a specific function, reflecting the process teaching mode of single-chip computer.

(2) Selection of sub-projects: Each sub-project can cover all knowledge points of this unit, and at the same time, it can also synthesize the knowledge and skills of single-chip computers that have been learned before. After all the sub-projects have been completed, students can design a single-chip computer project independently according to their own interests and interests. In addition, at the end of the training of single-chip computer technology application, they will use a comprehensive training project to strengthen the centralized training of single-chip computer development skills.

(3) Comprehensive expansion design: By combining the content of Huawei ICT Competition to develop an expansive comprehensive experimental design, students not only need to complete output control and input detection of single-chip computer, but also need to combine sensor technology with input detection of single-chip computer in the whole project development process. Students who have more ability can also contact ICT related technology in the laboratory and use it to achieve the functions of single-chip monitoring system.

(4) Organize and implement: students practice in groups, students in each group manage experimental equipment and materials by themselves, teachers use video recording to manage, and coordinate the development and production of the system. In the whole process, exercise the students' sense of teamwork and cooperation ability.

(5) Assessment and evaluation: divide students' theoretical achievements, practical ability, practical results and classroom performance into several indicators for weighted summation, and finally give the final results of the course.

(1) Promote the integration of industry, University and research: Relying on Huawei ICT College and aiming at Huawei ICT Competition and related certification, carry out the teaching reform of Industry-Education integration, and unite Huawei Authorized Training Center to promote the ecological development of ICT talents.

(2) Demonstration role: This project puts forward the reform methods and modes for the course construction of electronic information engineering (automatic identification of the direction of technical specialty) and communication engineering specialty, which will play an exemplary role in the teaching reform of other specialty courses of this specialty, and then serve as a demonstration sample for the reform of the course teaching of Applied Undergraduate Specialty in the pilot national comprehensive reform.

(3) Encouraging students' enthusiasm for learning: This project will conduct in-depth research and Practice on the basis of many years of teaching experience of single-chip computer course in our institute, combined with the teaching reform of advanced technology projects in Huawei ICT institute. Targeted design and development of the course supporting practical link teaching projects, to replace the traditional "plug-and-drop" validation experiments with "practical" projects, so that students can learn more purposefully and targeted. In order to solve practical problems, it can also stimulate students' enthusiasm for the study of theoretical courses, make the difficult to understand theory no longer dull, and achieve the purposes of teachers' love of speaking and students' love of learning.

(4) Enhance students' various abilities: How can the research of this project effectively cultivate students' innovative thinking and ability to discover, analyze and solve problems. The contents include:

Introducing "Actual Project Development Process, Process Control" into Teaching Process Design

"Task Book" - Explain Theory and Cases in Class - Complete Project Content by Students after Class - Evaluate Achievements. Teachers can carry out step-by-step teaching methods, arrange teaching plans according to students' learning needs and learning conditions. If students appear to be inefficient in a certain stage of the course learning, they should slow down properly. Teachers can set up a course system that combines comprehensive theory with practice to help students better achieve their learning goals.

According to their own personality and technical characteristics, students choose the corresponding project content. Let students experience the pleasure of career choice in advance. In the process of project completion, teachers should focus on training students according to their own characteristics and specialties, so that students can give full play to their own specialties and subjective motivation, and find a sense of accomplishment easier. Let the

students learn the theory in the book, familiarize themselves with the way of project development, and possess the professional qualities of enterprises.

Teachers' Participation in Role Playing to Promote Teaching Implementation and Evaluation. In the classroom, teachers give the general needs of the project, students as developers to formulate specific content, and actively communicate with teachers to improve needs, according to teaching objectives to guide students to actively learn related knowledge; Based on the level of students' abilities and interests, we can customize the assessment measures in different stages and levels, and give them positive feedback. The purpose of evaluating students can be achieved by combining experimental examination with theoretical examination, which can enhance the importance of students on experimental courses, thus improving the learning effect of students and promoting their diversified development.

Scientific teaching methods to improve teaching quality and optimize practice teaching. BLOOM classified teaching method, difference teaching method and group teaching method are integrated into the classroom, so that each student can participate highly in the classroom, think positively and gain results. Teachers need to pay special attention to the training of students' practical ability in the teaching process, formulate a curriculum system that combines theoretical knowledge with practical teaching, and help students form innovative thinking and cultivate certain practical operation ability by building a comprehensive, innovative and integrated course.

Developing Second Classroom with Students' Full Participation. The planning, scheduling, implementation and evaluation of the results of the tasks are organized and advanced by the project team members themselves. Video recordings guide students to study independently, pay attention to students' personality development, cultivate students' enthusiasm for self-study, improve teaching efficiency, and increase students' participation and fun.

Through the study of this course, students can master the basic knowledge of the principle and application of STM32 single-chip computer, acquire the basic theory and skills of the application system design of STM32 single-chip computer, master the design, debugging methods and development steps of each main link of the application system of STM32 single-chip computer. Develop students' comprehensive ability to analyze and solve problems. It will lay a solid foundation for students to study the follow-up courses and to take up related jobs with single-chip computer application technology after graduation.

4. Summary

With the concept of project-driven teaching, this paper introduces the small projects of related knowledge points around the key points and difficulties of single-chip computer course teaching. On the basis of mastering these theories and corresponding small projects of practice, it helps students to make full use of the knowledge related to other courses while completing the design and production of real products. Make the consciousness of "putting the truth into practice" germinate in the process of imperceptibility and scientific thinking. In practice teaching, abandon those local theoretical validation experiments, take the practical application of engineering as the background directly, and take the practical application equipment that meets the requirements of theoretical knowledge teaching as the teaching assistant means, so that students can learn and master the theoretical knowledge of single-chip computer in actual engineering.

Take students as the main body, pay attention to the cultivation of students' ability, select wireless transceiver of single-chip computer as the training project according to the knowledge content of single-chip computer course. In content, the system, integrity and engineering can be highlighted, so that students through the problems encountered from project practice, and then combined with the relevant knowledge learned from single-chip computer courses, to

have a deeper understanding of the role and use of each functional circuit, which will help to enhance students' interest in learning. With the inspiration and prompt of project teaching, it can understand the basic theories and methods in the single-chip computer course independently and comprehensively, enhance their ability of integrating theory with practice, improve their thinking ability and practical circuit application ability, and cultivate their innovative spirit. The whole teaching process highlights the student-centered idea. Focus on the training of students' abilities in all aspects. It not only enables the students to exercise the ability of using hands and brains in the teaching link of the actual project, but also greatly stimulates the students' love for the study of theoretical courses. To achieve the goal that teachers love to talk, students learn and finally understand.

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