

Teaching Reform for “SCM Principles and Interface Technology”

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Abstract. In terms of the current problems in the teaching process of “SCM Principles and Interface Technology”, the paper focuses on a set of loop practical teaching processes, including theoretical teaching, laboratory teaching, curriculum design and college students’ science and technology competition ,so that students can have certain capabilities in microcontroller hardware circuit design and welding, software programming and system debugging on the basis of understanding the fundamental principles of microcontroller, programming, memory and interface technology and other application knowledge. Therefore, the practical teaching mode integrated with both hardware and software and combined with measurement and control is quite necessary, which is suitable for the professional direction, and students' innovative ability, application ability, team spirit and hard work style training have been cultivated in every step, and researchers have achieved a better teaching result in practical teaching process.

Introduction

According to the “undergraduate teaching quality and teaching reform project in institution of higher education” implemented in “Twelfth Five- Year” period, the practical skills and innovation ability of students can be strengthened through a series of reform and construction. To implement this spirit, in terms of the current problems in the teaching process of “SCM Principles and Interface Technology”, the paper focuses on a set of loop practical teaching processes, including theoretical teaching, laboratory teaching, curriculum design and college students’ science and technology competition.

The aim of “Principles and Applications of SCM” is to cultivate students' creative ability and application ability in terms of SCM hardware and software. However, there are some problems in current SCM teaching, including the following aspects:

- 1) Teaching materials and experimental guidance are only taught in the teaching process of SCM, and most students can only do well in paper and complete good experimental verification[1].
- 2) There is less connection between SCM course teaching, and experiments, curriculum design, electronic contest and graduation design.
- 3) Resources for SCM experimental teaching is not enough, and fewer students have practical opportunities, so they can only complete in the lab with restricted time[1].
- 4) SCM-related design and innovative thinking are not adequately trained, which can't meet the needs of current science and technology development.

For the above, researchers have explored a new loop practical teaching process and comprehensive evaluation mode. On the basis of practical teaching, students’ practice and innovation ability, application ability, team spirit and hard work style have been cultivated to a great extent and Researchers have achieved good results in practice teaching[2].

Theoretical Teaching

The typical SCM structure and main functions of each part should be emphasized and explained in the curriculum theory teaching process, and students can have self-study for some unusual functions, and a large

number of enumerations and description of the project examples will be used to deepen students' understanding of knowledge[3]. Researchers should adjust teaching method according to the curriculum content, and traditional teaching methods attach importance to the systematization of teaching, which leaves no space for students to think. The "teacher, classroom, textbook-centered" teaching method has been transformed into the teaching method which is based on "students' mastery of knowledge and ability cultivation", a variety of teaching methods such as explanation, enumeration, discussion, question answering, self-learning and so on should be applied to cultivate students' logical thinking ability, association reasoning ability, analytical skills and self-learning ability [4-5].

Commonly used teaching methods are as follows:

1) Active teaching

A few minutes are set aside before class for students have to prepare class, then the teacher explains the main points of this class content, which can help students deepen memory and understanding of knowledge.

2) Discussion-based teaching

After the teacher explains an important knowledge point, the teacher asks students about the main points of said content, and the teacher can make adjustment based on feedback from students and can also encourage students to discuss in small groups. In addition, interactive learning in the discussion will stimulate the enthusiasm of students to form a student-teacher interaction atmosphere.

3) Illustrating-based teaching

When the teacher explains more abstract knowledge points, illustrating- based teaching method is often used to familiarize students with the knowledge points to understand and grasp.

4) Exercise-based Teaching

In order to consolidate learning performance for students, the teacher can assign homework and ask students to come to do on the blackboard and then give answer reviews, so that students can fully digest what they have learned in practical exercises.

In the teaching process, the traditional one-man show in stage has been transformed into the teaching process with the participation of teachers and students by optimizing teaching contents and transforming teaching methods, so that students can complete cognitive learning independently and creatively, therefore, the integration of teaching and learning can be conducted to a great extent to accelerate the pace of learning.

Experimental Teaching and Curriculum Design

In order to enable students to deepen their theoretical knowledge, integrate theory with practice and improve students' ability to analyze and solve practical problems, Researchers have carried out many reforms for experimental teaching and curriculum design.

Course experiment is to verify students' classroom knowledge absorption and the preliminary mastery of the basic programming and application capabilities. Considering the characteristics of the course, laboratory capacity and level of students, the experimental teaching content has been reformed and the comprehensive application-oriented experiments, design-oriented experiments and development experiment for application system have been added. The purpose of these experiments is to broaden students' horizons and improve their ability to integrate knowledge, make innovation and application capability. In this process, teachers are only regarded as facilitators; students extract the main line and the essence from existing knowledge and skills through positive thinking and integrate with their own independent thinking activities. And then students can raise new problems and form new methods and new ideas, to complete the transformation of innovation consciousness from innovation activities, which show the results of experimental teaching. Perceptual knowledge enhancement and rational knowledge sublimation can be acquired for students, so that students can

change from passive response to experiments to active experimental research, which will fully tap the potential of students and develop creative thinking[6-7].

Course Design focus on independent work, independent thinking and problem solving skills of students. Students should be the main roles in the process of designing a comprehensive system based on SCM, and students should establish design proposal, search information, determine parameters and other steps independently, and the teachers only give guidance in organizing discussions, Q & A, design ideas and commissioning. After curriculum design training, students will not only be able to combine theoretical knowledge with practical application, but also can grasp the comprehensive application knowledge related to electronic circuits, components, wiring and other aspects, therefore, students are provided opportunities to exercise welding technology, troubleshooting and commissioning, software programming and equipment application skills. It is helpful to independently design and develop SCM system for students after graduation[8].

The practice teaching link is reasonable and scientific, which is popular with students, which has good teaching effect and is in line with talent cultivation objectives.

Science and Technology Competition

The “Science and Technology Innovation Base for College Students” in the college should be based on the curriculum to carry out science and technology practices related with SCM and electronic production. The model for the cultivation of creative talents which is student-centered has been established, in the meanwhile, a strong innovative practice atmosphere has been formed. By virtue of Undergraduate Electronic Design Contest and the Intelligence Car Competition, practical ability of students, innovation awareness and entrepreneurship can be cultivated in innovation practice.

National Undergraduate Electronic Design Contest is one of academic competitions advocated by Ministry of Education, which is a people-oriented scientific and technological activity for college students, with the aim of promoting the reform of disciplinary system and course content of information and electronic courses for universities and colleges, to help colleges and universities to implement quality education and cultivate innovative consciousness and practice basic skills, teamwork spirit and the study style with theory integrated with practice, to help cultivate students' engineering practice qualities and improve the ability of students to carry out electronic design in terms of practical problems and create conditions for cultivating outstanding talents.

The Freescale Intelligence Car Competition regards “emphasizing training, focusing on participation, encouraging exploration and pursuing excellence” as the guiding ideology. The Secretariat of the competition designs and normalizes the standard hardware and software technology platform, and the contest procedures include theoretical design, actual production, vehicle testing, live events and other sectors, which requires students to form teams and work together to experience the whole process of a engineering research and development project from the initial design to implementation. The contest integrates financial science, fun and entertaining as a whole, based on the background of the rapid development and broad prospects for automotive electronics, covering automatic control, pattern recognition, sensor technology, electronics, electrical, computer, mechanical and others.

In the past five years, students in this base have achieved excellent results, including 10 competition awards of national level and more than 20 provincial contest awards in the Undergraduate Intelligence Car Competitions, Undergraduate Electronic Design Contest, "Challenge Cup" Extracurricular Scientific and Technological Contest and Robotics competitions and other events organized by provincial and national organizations.

Students not only can design based on their knowledge of specific tasks, but also can consolidate the theoretical basis according to the design result through the participation of the above-mentioned contests. Meanwhile, the abilities of analyzing problems, solving problems and innovation capability can be cultivated in the process of completing design tasks.

Conclusions

In terms of the curriculum teaching of “SCM Principles and Interface Technology”, the paper has designed a set of loop practical teaching processes, including theoretical teaching, laboratory teaching, course design, and science and technology competition for college students. Therefore, the practical teaching mode integrated with both hardware and software and combined with measurement and control is quite necessary, which is suitable for the professional direction, so that students are equipped with comprehensive knowledge application abilities on the basis of having a mastery of relevant knowledge of SCM. This method can develop students’ basic engineering practice ability and innovation and stimulate students’ interest and potential to get engaged in scientific research and exploration. Researchers have achieved a better teaching result in practical teaching process.

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