Course Reform Based on the Theory of Integration of Theory and Practice

Xiao-wei WANG, Yan-ping CUI, Zhi-zhi YAN and Juan GAO
Army Engineering University of PLA, Wuhan, 430075, China
*Corresponding author

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Abstract. Based on the theory of “integration of theory and practice”, the teaching mode of “theory teaching and post-experiment verification” is changed into “the integration of theory and practice” in the single-chip Microcontroller (SCM) curriculum reform. It’s suitable for vocational college students to take “learning by doing, doing by learning” principle who are in line with high image thinking ability. This article systematically summarized the implementation process the conditions, supporting facilities construction and the problems to be solved in the next step along with the SCM technology basic curriculum reform of our university.

Introduction
The “SCM Technology” course is an important basic course for students in our university. Through five years of curriculum reform and construction, the teaching is suitable for the characteristics of students, more in line with school teaching reform principle, teaching content system is more reasonable, the ability of teaching staff improved significantly, teaching condition is more perfect, assessment and evaluation system is more mature. The course is further close to the job requirement. The concept of “ability-based, task-driven and action-oriented” has been conscientiously implemented in the teaching process. Task-driven and situational teaching model are used in this reform. The students learn knowledge along with completing the training task, and deepened the understanding knowledge. By this way, students improved their applied ability and innovation ability of SCM. The basic knowledge and skills of applying SCM are mastered by students and are solid foundation for learning follow-up courses.

The Main Content of SCM Curriculum Reform
Established the Capability Related to SCM Circuit
Different jobs and different posts need different roles, but the process of the basic structure to complete the task of is similar. The SCM course is designed and developed according to the typical work process of equipment circuit maintenance related to the SCM circuit. The implementation of each learning situation is a complete working process.

Students participate in and complete the whole circuit design, production and troubleshooting of SCM, and gradually form a sense of belonging, responsibility and professional ability required for circuit repair practice.

The Establishment of Three Learning Situations of SCM
According to the SCM circuit repair growth and cognitive learning rules, and the students' sustainable development, the curriculum is divided into three learning situations from easy to difficult, from simple to complex. They are basic training, interface application training, comprehensive application Training. In the three learning situations, a number of corresponding sub-learning situations were set up in accordance with the SCM course content. As shown below.
Each sub-learning scenario is taught with a complete product-creation and troubleshooting process, which trains the student's ability to work in the course and fosters the ability and aptitude of the student's circuit expansion. Learning situations are implemented starting from the analysis of the circuit, so that students know what they are doing clearly. And then, they think about how to do it and what basic knowledge and components are used. These steps are the technical analysis, device data access and component preparation. Relevant knowledge points can be taught by the teachers, and students can also self-study in advance with the micro-class. Teachers’ students are guided to view the data manual of required components and features and hands-on practice. And then, the students complete the circuit design and programming, circuit production and troubleshooting, the final product are shown to all classmates. The expand project broaden the horizons of students, cultivate students' innovative ability and sense of innovation.

SCM is an abstract and practical course. Parts of learning situations in teaching are combination of classroom demonstration and student practice. The demonstration in classroom turns the abstract theory and the boring program analysis into vivid examples, and cooperates with the intelligent car training platform widely used in the market.

**The Implementation of the Process Evaluation System of SCM Course**

Assessment is an important part of curriculum design. It is an important way of education evaluation. It is not only an evaluation of students' learning, but also a feedback of teaching work. An effective assessment method can improve students' enthusiasm for learning, guide students to learn independently, and promote teaching result.

At present, how to correctly and effectively carry out the curriculum evaluation of vocational education is still a difficult point in higher vocational education. The concept of modern vocational education emphasizes people-oriented overall evaluation and assessment. The contents of the examination of student's curriculum are no longer limited to the evaluation of knowledge points and skills points, but also the quality of students’ completion of work tasks, cooperation ability and personal qualities.

“Integration of theory and practice” SCM curriculum assessment turns “written examination” assessment into “formative assessment”. The implementation process and the quality of project tasks are considered together. This assessment method strengthens on the experimental, practical aspects, and different with the evaluation criteria of colleges and universities.

Students are evaluated in teamwork, and 2 students are in a team group. The assessment pays attention to the capability of the circuit of single-chip production and troubleshooting. The assessment is performed in the stages of design process, teamwork, circuit board display, defense. Evaluation is including student self-evaluation and teacher evaluation.

During the self-assessment period, students communicate the outstanding achievements and the existing problems of each group face to face. Students participate in the evaluation in the evaluation of the perspective of students to judge the strengths and weaknesses of each group. Each groups can receive the help of their classmates. During the teacher evaluation stage, the teacher gives a concrete assessment of each team's situation and points out the problems.

The “Integration of theory and practice” assessment system is throughout the learning process. Students focus on the learning process and results of each learning task, and who only care about the final exam in the past. The enthusiasm of students and interest in learning are greatly enhanced. Through the project training and assessment from simple to complex, students increased self-confidence, the relations between students and teachers is better, the students ask more questions, and achieved good teaching results.

**Supporting the Construction of Teaching Condition**

The textbook is “SCM Project Guide” which is published by the Shenzhen Vocational and Technical College. The original version of the program is written in assembly language. After years of teaching
practice, we felt that the compilation process was not sufficiently readable, the degree of modularity was not enough; it was not consistent with the students' cognitive habits and did not match the mainstream language system. The main training textbook is replaced to “SCM Project Tutorial (Second Edition)”, this version of the program is written in C language, the program structure is clear, and the program is more concise and simple.

In order to carry out project training effectively, we wrote a book named “SCM Training Manual”, which contains the mission statement, knowledge points, guideline, implementation plan, implementation process record form and training evaluation form for each task. This “SCM Training Manual” effectively enhances the effectiveness of project training.

According to the new curriculum content and teaching organization form, we adjusted almost all contents in the multimedia and online teaching resources, which is full accordance with the project-based teaching mode. We recorded the complete process of student project production to facilitate students self-study and to standardize the whole process of project training. And we recorded a new web course.

The teaching of “Integration of theory and practice” SCM curriculum conforms to the development trend of vocational education, effectively improves the students' basic qualities and professional abilities, effectively excavates the potential of students and embodies the concept of people-oriented education. From the teaching practice of 5 years, the curriculum reform is successful. Of course, in the following course construction, we should continue to reform the teaching methods, constantly adjust the teaching content and teaching methods dynamically, pay attention to the theory with practice, and enhance the teaching effectiveness of this teaching mode.

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