Analysis of Effective Innovation Strategies on Electronic Information Engineering Specialized Practical Teaching

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Abstract
Electronic information engineering has the high request to the engineering practice ability. Under the guidance of the college's specialized practical ability training "roadmap", the reform of the practical teaching method of electronic information engineering is becoming increasingly urgent. This paper focuses on the construction of effective innovation strategies on electronic information engineering specialized practical teaching, and the connection of the social demands, the ability training of students and the practice teaching resources. In order to truly realize the training goal of the college' "compound talents", we must take the college specialized practical ability training "road map" as the guidance, take the student as the main body, and pay attention to the combination of theory and practice, and the combination of in class and after class. Practice has been proved that the practical innovative strategies guidance by the "road map" is effective, and the students' creative ability has been greatly improved.
Key words: SPECIALIZED PRACTICAL ABILITY TRAINING "ROADMAP", ELECTRONIC INFORMATION ENGINEERING, PRACTICAL TEACHING INNOVATION, EFFECTIVE STRATEGY

1. Introduction

Universities take the task of training high-quality talents and students' creativity is the core of students' overall quality. To solve the engineering students' lack of practical ability and innovative capacity and graduates can't accord with social need and industrial developments, our university introduce the ideas and methods of "roadmap" into education development and implement " practical ability road map" for undergraduates. This article is to practice under the guidance of the "roadmap", explore effective innovation strategies on electronic information engineering specialized practical teaching [1].

Westerns pay great attention to practical teaching activities. The United States takes practical teaching in a prominent position, creating a series of distinctive practical teaching activities, MIT launched practice program for undergraduate in 1969. Stanford University to use their talent advantage companies a wide range of business cooperation with Silicon Valley electronics enterprises, and the University of Cincinnati pioneered cooperative education model, paid attention on learning skills and took more conducive to promoting full employment practice course for student, proposed college courses should promote employment-oriented for students.

Domestic colleges enhance to provide

engineering students' practice and innovation, do a lot of exploration and practice to cultivate specialized practical talents [2]. Many universities amended or re-enacted the teaching program to strengthen the practical teaching and innovation sectors and introduced some advanced teaching concepts and methods from abroad.

Based on absorbing foreign advanced teaching concepts and methods, combined with specialized practical ability "road map" of electronic information engineering, according to the requirements of capacity-building programs, making suitable practice innovative solutions, explore effective innovation strategies on electronic information engineering specialized practical teaching, to enhance innovative ability of students.

2. A clear thought of the practice teaching innovation from the specialized practical ability training "road-map"

Specialized practical ability training "roadmap" adhere to the combination of social needs, industry needs and students' ability development. The teaching and learning activities should develop with the economy, society and the development of the industry. At present, our university is increasing the practice of teaching innovation, construction of practice teaching system must be closely combined with the professional personnel training plan, and service in professional personnel training plan. According to the classification of practice teaching points planning level, individual assessment principles for innovation, the focus on ability training objectives and teaching practice of theoretical teaching effects of practical teaching scheme design. Practice teaching reform is a systematic project, in the process of innovation must focus on the overall planning and the system construction. The implementation design of integrated practice curriculum system, practical teaching content, practical teaching methods and management of open laboratory, experimental teachers. The practical road map is as shown in figure 1.

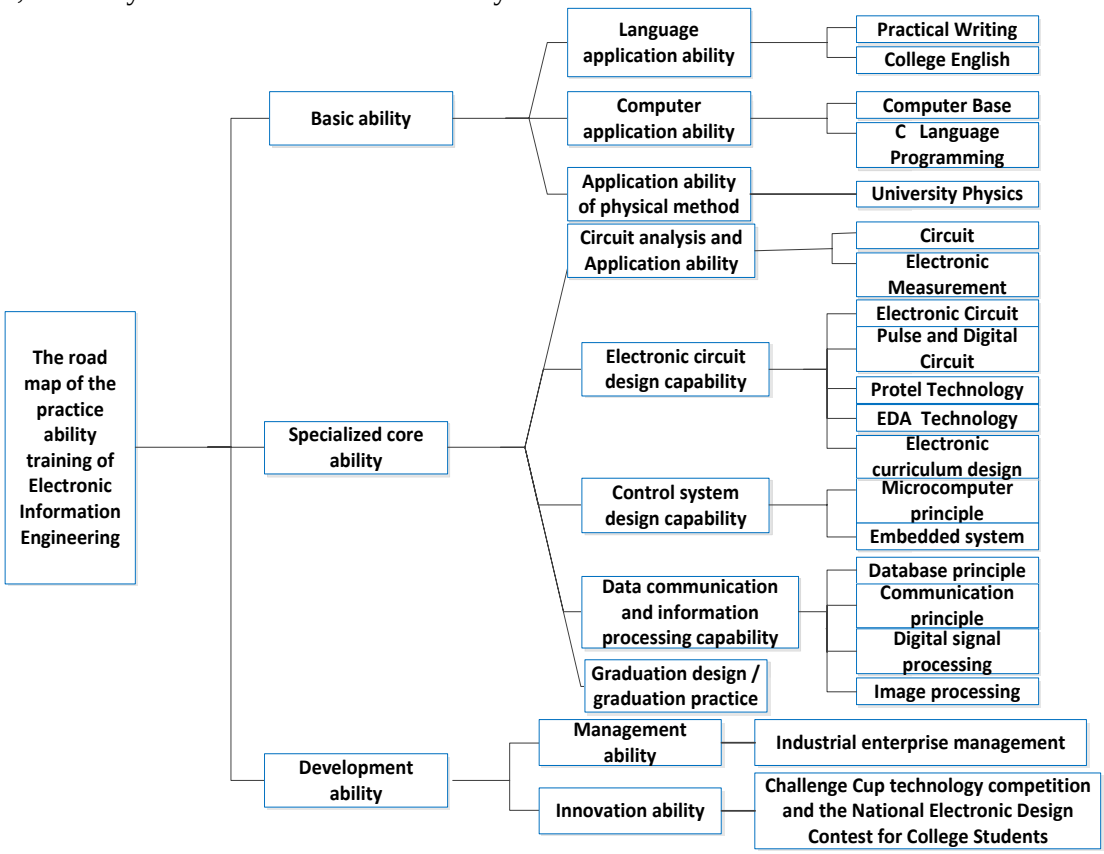

Figure 1. The practical road map

3. The top-level design of practice teaching system and the overall framework

According to the targets and requirements of electronic information specialized training, practical teaching to do coordinated process, continuous line, different

levels, a new experimental teaching system construction of the three levels of practice teaching-experiment teaching, teaching practice, graduate design.[3] Experiment teaching base level, the professional level and the integration level, by level of education, comprehensive ability of students to apply knowledge, analyze problems and problem-solving skills and a preliminary innovation ability, teaching levels shown in Figure 2; teaching practice providing opportunity to contact the enterprise for students, using of a two-week teaching practice week, leading the students to visit related enterprises, to enable students to understand the profession in the practical application of knowledge; graduate design is a summary of student for the four years' study, is the first small task of practice student complete independently. Using of the specialized knowledge had studied, under the guidance of the teacher's request, complete the appropriate design. Graduate design gives students an opportunity to demonstrate their academic ability, and also lay a good foundation for the future job.

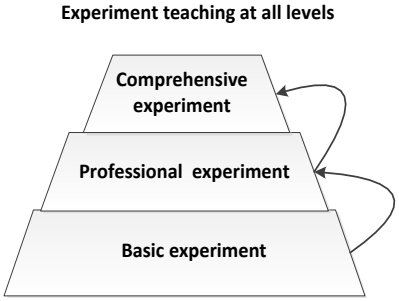

Figure 2. The experiment teaching levels

4. Adding designing experiments and comprehensive experiments

For Electronic and Information Engineering, building separate practice teaching system, is to improve students' practical ability and design capability. It must promote the content adjustment, integration, multi-level, resilient structure of the practical teaching system. [4]It should add the designing experiments and comprehensive experiments, and increase the proportion of the designing experiments and comprehensive experiments.

Based on the nature and characteristics of the courses, it should determine the designing experiment courses and projects, and gradually increase the proportion. For example, basic courses as analog electronics, digital electronics, signals and systems, should be add more basic experiment, through basic experiments allow students have a deeper understanding of the theoretical knowledge in the class; as MCU course, EDA technology, DSP technology, image processing course should increase designing experiments and comprehensive experiments based on basis experiments, deepen the difficulty of experiments using the comprehensive curriculum design, combining the expertise of several courses and complete the task of the course designing by students.

Table 1. The level of experiment classes

level of experiment classes	Teaching purpose
Basic Experiment	During the experiment, students learn the experiment content, learn various instruments operations, learn the experimental data measurement and processing methods, train serious work attitude.
Professional Experiment	Allow students to utilize the knowledge and skills, develop students ability to use and the unit (function) design capacity; under the guidance of teachers to analysis the functions, features, design according to the given circuit or system to achieve a circuit or system function, and tests.
Comprehensive Experiment	Focus on intellectual development, to enhance engineering capability through the ability of using knowledge, to inspect the design and laboratory capacity of student. So that students combine the basic theory with the experimental applications and deepen students' methods and skills on the basic experiments. Students can get the ability of designing experiments independently and the experiment

	operations.

Test equipment configuration should consider the need of designing experiments, providing the appropriate development environment as the design platform, such as DSP lab addition to the installation of CCS3.0 development environment, it also should install MATLAB, QUTARS software to facilitate the creation of a comprehensive test; and should design the experiments content scientific based on the need of designing and comprehensive experiments, write the experimental instructions with the advanced contents; have the computer and EDA technology into practice teaching, outstanding the advanced methods of the practice teaching, through comprehensive experiment course as the "electronic circuit design experiment" and "signal processing experiment", enabling students to proficiency in designing DSP, EDA and common circuits and electronic systems, guiding students to use new devices, acquiring new technology and learning new ways to foster innovative thinking ability and comprehensive ability to analyze problems, building on a foundation for designing experiments and comprehensive experiments.

General teaching considerations, the ability and knowledge of students, the experiments of each course is divided into three levels, as shown in Table 1.

5. Establishment a new teaching system of open laboratory

5.1 A new system of open lab

Experimental teaching innovation is an important content of disciplines construction, and it plays an important role in promoting students' practical ability, experimental technology and innovation. Open Lab means a college official establishment, under the premise of the complete normal teaching, using of the existing teachers, equipment, environmental conditions and other resources to be used for students.[5,6] Our specialized laboratory conditions are relatively good, but it is the traditional laboratory management mode, only when the experimental class students can enter, in the other time, the laboratory is closed. This management style is not only a waste of lab resources, but also it can't meet the students' requirements. Colleges should pay attention to the construction of open lab, and the lab work into teaching innovation. Each laboratory should be in the experiment teaching innovation, full use of existing laboratory conditions and create the necessary conditions, actively develop open laboratory work, take a variety of forms that open labs to the students.

5.2 The use of open laboratory

Students consider of their actual condition, can option basic training experiments, and can option the design, comprehensive, research experiments. Open experiment, students can choose the class teaching experiments, it may also be extra content to meet the requirements of different levels of students.[7] Experiments form as "fixed + freedom", that is basic verification experiments teacher predetermined fixed time, the design and comprehensive experiments, students can according to their own preview, in the laboratory development time, choose free time to complete the test independently. Teachers are responsible for answering questions, helping students at different levels to choose experimental module.

6. Conducting various forms of extracurricular activities

The lab resources are shared through campus network, the device information , operational data to a computer system in the experimental center, realized online reservation and independent lab resources sharing, to facilitate all teachers planning the experiment time and students independent learning, which greatly improved the efficiency of laboratory management; also should take advantage of the Internet, through online answering question, shooting experimental guidance of Micro-lecture, sharing experimental resources to broader social range, build a " comprehensive, development and sharing" practical teaching platform; innovation lab provide a hardware environment for students to do experiments in their spare time, and a instructor for the top-talent students have teachers' guidance, training specially, top students are directly involved in the research work of teachers and do small research projects independent. It has played a very active role in improving students' practical ability.[8]

7. Effects contrast

With effective strategies for practice capacity providing, the students' practical ability indeed increased, the ability to complete the experiment independently, gradually

enhanced. 2012 grade students (29) in electronic information specialty as an example, before and after the use of effective strategies for two semesters, illustrate the effects of the effective strategies as shown in figure 3.

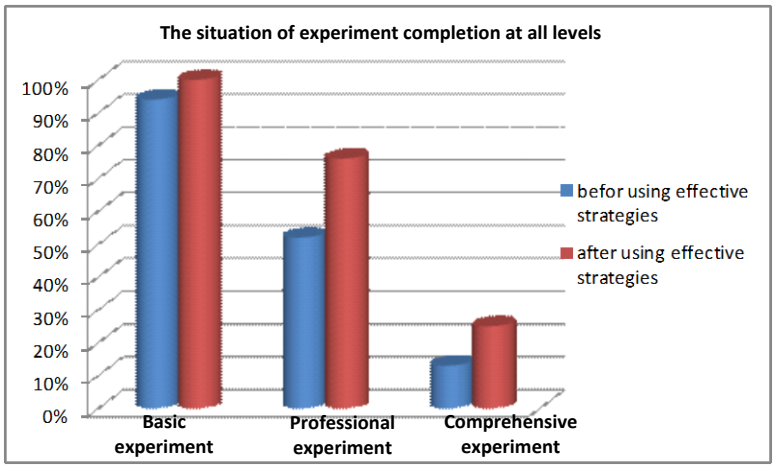

Figure 3. The situation of experiment completion

As seen from the figure, using the effective strategies, the students' practical ability has been improved significantly, especially comprehensive level experiment, increase by 50%, greatly inspired the students' ability to innovate, to lay a good foundation for the future job.

8. Conclusion

In the electronic information specialty, college student training and practice teaching innovation must be based on specialized practical training "road map" as a guide, students as the main body, fully focus on theory and practice, combine curricular with extracurricular, pay attention to basic ability, specialized ability and development ability. The real goal of the college culture is training "composite" talents. Practice has been proved, that the practical innovative strategies guidance by the "road map" is effective, and the students' creative ability has been greatly improved.

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