

Research Article

Curriculum Study on “Food Electronic Technology” Based on Project-driven Pedagogy

Li Tianhua, Pan Zhengkun and Zhou Tingyan

School of Physics and Electrical and Electrical Engineering, Zunyi Normal College, Zunyi, Guizhou, 563002, China

Abstract: This study adapts to the requirements of China's basic education reform, discusses the essential characteristics of the course teaching of “food electronic Technology”, studies the practice of curriculum applying project-driven pedagogy by combining the current teaching status of schools' food electronics major and the course features of “food electronic Technology” and makes some recommendations about innovative measures. “food electronic Technology” is an elementary course of food electronics major in various types of schools in China and it plays an extremely important role in the cultivation of students' abstract thinking ability, logical reasoning ability and operational ability. It is both the core curriculum of cultivating practical talents of food electronics manufacturing industry and the compulsory curriculum of front-line technicians of modern food electronic products manufacturing industry.

Keywords: Food electronic technology, innovative measures, project-driven pedagogy

INTRODUCTION

With the development of science and technology, particularly the continuous emergence of new technologies, new products, new processes and new materials, new food electronic products are rapidly gaining popularity. In particular, products like appliances, computers, peripherals, digital products, mobile phones and communications equipment have become indispensable information tools of people's lives, entertainment and work. In recent 3 years, China has become the world's manufacturing base of food electronic products, ranging from basic food electronics, machine to the design and production of the entire system and has become a huge industrial chain. The products made in China have spread all over the world. Thus, a large number of highly qualified workers and technicians are required in the food electronics manufacturing industry, especially the skilled technical personnel with professional skills. Because they determine the quality and technical level of products, it is necessary to constantly improve the quality of manufacturing and technical personnel. Continuously improving the training methods of practical skills is the technical support for training of skilled personnel.

The course applies “project-driven” teaching method and project teaching method breaks the traditional teaching methods in the past. In the implementation of project teaching method, teachers' design for teaching link cannot just focus on knowledge, but should carry out planning and

management of the project by combining the characteristics of students more. The teaching activity center of the entire teaching process is whether students can complete specific project tasks (Qin, 2013). When students are made to have a strong incentive to complete the project tasks, ideas and programs to complete the project are proposed through analysis and discussion of project tasks. Meanwhile, students collaborate with each other and conduct exploration under the guidance of teachers, to achieve the building of knowledge meaning in the process of completing projects. Thus, students have been given more responsibility in the learning process and the responsibilities will affect their learning, encourage them to focus on their success of study and work. Meanwhile, in the exploring process of solving project problems, student's operational ability and their ability to solve practical difficulties are improved.

MATERIALS AND METHODS

Basic training: With the rapid development of food electronic technology, constant emergence of new technologies, the types of food electronic products are constantly upgrading and the circuit structure and processes are increasingly complex, which greatly increases the difficulty of products production and maintenance. The rapid popularization of the production process and maintenance knowledge has become the most important issue of students. How to quickly and fully understand the features and usage

Corresponding Author: Li Tianhua, School of Physics and Electrical and Electrical Engineering, Zunyi Normal College, Zunyi, Guizhou, 563002, China

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characteristics of food electronic components and to master the testing, substitution and welding methods of food electronic components have become prerequisites for the production and maintenance of food electronic products. Recognition and detection of food electronic components are the bases of producing, assembling, debugging, testing and maintaining food electronic products. The basic practical knowledge of ordinary food electronic components and semiconductor devices should be introduced first and then the identification, testing and welding practice of different types of food electronic components should be introduced and finally to master practical skills through basic training. Described from the aspects of types, features, functions of food electronic components, through analysis on various components of food electronic products, combining with the characteristics of actual circuit and applying multimedia equipment to use the demonstrating ways of practical diagram and structural anatomy, the course helps students have a full understanding of various components and then master the repairing and welding skills of food electronic components.

Project design: At the beginning of project planning, the overall concept of project should be established in advance, including the knowledge and project implementation process related to the project. Clear project objectives, project structure and project understanding are required. Teachers must study carefully on project outcome, schedule and management measures. Project's work task is to make a real, practical food electronic product. As there are large projects and small projects, teachers should develop some tasks according to the teaching knowledge and teaching objectives at this stage, explore and select topic with students under created actual or virtual situation and ultimately determine the project tasks to be implemented. In practice, the appropriate practical projects should be first identified, so as to better carry out the next step. And whether appropriate project can be developed is a prerequisite to carry out project teaching (Huang, 2012).

The determination of project should be student-centered and teachers can give some advice on the basis of understanding students' idea. As students have no comprehensive understanding on the overall layout of themselves and discipline, teacher cannot casually deliver a project as a task to students. Determination of projects should consider the following factors: whether the project has practical value for students; whether the project is attractive to students; whether the project can cause students to think of the knowledge system constructed in the past and their experience of previous projects for participating in the implementation of this project; whether the project can combine the theoretical knowledge and practical skills of certain stage to allow students to use both hand and brain and stimulate students' full potential; whether the schedule of project can meet the requirements; whether the project can be

completed under existing school facilities; whether the follow-up projects are associated.

After students accepting the task, teachers should guide them to think positively, get them to fully express their views, understand the requirements of project tasks, explore the best ways to complete projects and have clear goals and learning orientation. In order to improve the effectiveness of completing task, students are divided into cooperative groups. The basic principle of division is ability complementary, combining the comprehensive condition of class and experimental condition of school. The best method to complete project should be proposed through discussion and by requiring students focusing on learning task and applying collective wisdom.

Outcome evaluation: Demonstration of learning outcome is an effective way to stimulate students' initiative and cultivate students' extension and judging ability. In the teaching of courses, teacher should organize group to conduct outcome demonstration after completing learning task, ask students to carry out evaluation to each other and then teacher should give the final comments. Before planning project process, the evaluation system of project completion should be first planned. Each project should have a clear set of output results which is called the project works. The work itself reflects learning objectives, with students' engagement in problem-solving activities in the project, teaching aims are not only the study of knowledge, but also close attention to how students apply knowledge and skills and teachers should evaluate the performance of students. These evaluations should be more comprehensive than the evaluation methods of traditional learning, not just focusing on the results of projects completion, but also on the process of projects completion.

RESULTS AND DISCUSSION

Purposes and requirements of practical training: The purpose is to consolidate and deepen the learned knowledge of food electronics technology, understand and initially master the basic skills and methods of producing, debugging and researching general food electronic products and comprehensively improve students' ability to practice, analyze problems and solve practical problems; enable students to obtain a certain perceptual understanding of food electronics production and lay preliminary practice foundation for their future engagement in the production and innovative design of food electronic products. The request is to understand the electrical schematics of installed food electronics and correspond it with the actual circuit boards, master the function features, performance and recognition methods of food electronic components, be familiar with the simple general knowledge of the whole assembly of food electronic products and master their operating skills (Li, 2008).

Manufacture of MF47 multimeter: Multimeter is one of the necessary instrumentation of electrician and every electron worker should skillfully master its working principle and application method. Through the practical training of multimeter's principle and installment, students are required to understand its working principle and grasp the technology essentials of soldering and the application and debugging methods of multimeter. Students should learn to install, debug and apply multimeter on the basis of understanding its basic working principles and also learn to exclude some common faults of multimeter. Students are required to learn to use some common electrical tools and instruments, such as needle nose pliers, wire strippers and multimeter and to master some application methods and working principles of some commonly used switching devices (Fu, 2004). Through this internship as electrician, students come into contact with certain electrical knowledge, realize connection between theory and practice, recognize the shape and structural characteristics of some common electrical appliances and lay a foundation for the learning of subsequent courses.

Practical training project refers to the principle and installation of pointer type multimeter, therefore the structure, working principle and application method of pointer type multimeter are emphasized. First, the teachers would explain the working principles of MF47 multimeter and propose the following questions to students. Why does the resistance use color ring to show the value of resistance? What is the number of the value of resistance represented by black, brown, red and green? How to judge the polarity of diode and electrolytic capacitor? How to install gear switch knob and brush knob? What should be prepared before component soldering and what is the requirement of soldering? What is the role of potentiometer? How to correctly use a multimeter? What are the installation steps of potentiometer? What should be emphasized for the soldering of diode? How to adjust and install battery plate? What are the types of multimeter? Thus, students would complete the training program with problem-solving ideas. Students are asked to recognize every part in accordance with power point, open the multimeter box and put parts on the back cover, resistors and other components in a plastic bag, to avoid being lost. Contrasting to power point, it can be seen that the control and display panel can be divided into upper display header and lower control switch panel. It should be noted that the header should not be broken or shaken by hands. Gear switch is combined by the gear switch knob installed in the front and the brush knob installed in the back. Measuring circuit board has yellow side and green side, green side is used for welding and yellow side is used to install components.

The installation steps of MF47 multimeter: Making an inventory of materials, recognizing diodes, capacitors and resistors, conducting preparatory work before soldering, welding and installation of components, installation and adjustment of mechanical components, excluding faults of multimeter, applying multimeter and assessment. Assessment requirements: error-free installation without missing equipment, flexible rotation of gear switch knobs, artistic soldering spot with suitable size, no cold solder joint, debugging meets the requirements, the components without losing or damaging and the proper use of various gears.

Project process evaluation: According to the teaching observation on the project teaching class, teacher-student interaction, class notes and assessment of self and others, it is found that most of the students can blend in the teaching activities in classroom, can correctly understand the requirements of the project and carry out project activities in accordance with project processes. They can independently access information, discuss with each other, exchange learning experience, think and ask questions, ask teachers and students and pay attention to the explanation of teachers and students. Team members cooperate with each other, learn from each other and deepen the study on problems, debug and optimize project solving method under the guidance of teachers. Basically they are able to pay their own efforts for the completion of the project in accordance with the arrangements for project planning and the coordination and arrangement of tasks. In the course of the project completion, students will solve the problem through initiatively asking and discussing with students and teachers, accessing to information or self-learning approach when faced with difficulties. Most students would find ways to solve the problem in time, but individual students do not study the problem, do not actively think or ask others when encountering difficulties.

CONCLUSION

Teaching case proves that project-driven teaching helps students understand the importance of combining theory with practice, improves students' ability to analyze and solve problems by themselves and enhances their ability to work independently (Zuo, 2008). When encountering a problem, they can calmly analyze the reasons for their problems until they can independently solve these problems. Therefore, it can mobilize students' interest in professional learning, improve all aspects of quality of students and improve the effectiveness of teaching. Therefore, the implementation of the project-driven teaching pedagogy promotes teaching reform, changes the traditional teaching mode and provides a new way of thinking for the effective teaching of specialized courses like food electronics. At present, various

institutions in China are carrying out reform of teaching contents and curriculum system and its core is to implement quality education, focus on cultivation of ability. There is no doubt that this reform greatly touches food electronic teaching field which focuses on cultivating students' operational ability and innovation ability. With the development of food electronic science and technology, the emergence of new teaching theory and in-depth teaching reform, practical teaching should become an important part of future food electronics and electrician teaching. To this end, educators should gradually establish an innovation system of the practical teaching of food electronics curriculum and focus on cultivating students' ability in engineering application.

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