

Research and practice of project-driven teaching model in "Visual C ++ Programming Design"

Zou Qingyu¹, Liu Baisheng², Liu Yan³, Xing Liyun⁴

¹College of Electrical and Information Engineering of Beihua University, Jilin, China

²College of Electrical and Information Engineering of Beihua University, Jilin, China

³College of Electrical and Information Engineering of Beihua University, Jilin, China

⁴College of Electrical and Information Engineering of Beihua University, Jilin, China

⁴Corresponding author

E-mail: ¹*zouqingyu2002@126.com*, ²*lbs_me3385@126.com*, ³*jacquesliu@126.com*,

⁴*xingliyun116@foxmail.com*

Abstract

At present, many colleges and universities set up the "VC++ program design" course. But the teaching of this course is still stays in the classroom and experimental stage. Therefore, we proposed the hierarchical level project-driven teaching method base on "Conceive, Design, Implement, Operate" framework for the engineering education curriculum. With this method the teaching steps developed according to the real projects. The process of this method include five levels: project selection and demand analysis, Modular teaching content, low-level function implementation, high-level function implementation and software testing, project acceptance evaluation and analysis. We implemented the hierarchical level project-driven teaching method in VC++ program design course. From the results in this paper, we conclude that the hierarchical level project-driven teaching method integrated the advantages of both hierarchical teaching method and projects driven method, which effective improved for traditional project-driving method. It is regarded as a kind of new method suitable for applied talents training.

Keywords: Visual C++, teaching model, project-driven, practice, software.

1. Introduction

Visual C++ is a powerful visualization application design language, which widely used C++ development environment based on Windows platform. It is a kind of high development efficiency of high-level programming languages to develop windows applications because of supporting object oriented programming method and MFC class library programming. It is necessary for offering VC++ course in relevant specialities of higher education. Students could improve the professional ability by means of mastering VC++ language grammar knowledge and programming skills. By studying and practicing VC++ program design course, students not only could use C++ language skillfully to compile program code on Windows platform and Visual C++ visualization development environment, but also could have the thought of software engineering with the implementation of comprehensive and high complexity of the basic professional skills required for a software development project.

2. The development of "Visual C ++ Programming Design"

At present, many colleges and universities of science and engineering specialty set up the "VC++

program design" course in science and engineering specialty as the main aspect of computer application ability training of students [1]. With the growth of market demand of all kinds of visual information system, the student demand for "VC++ program design" course also increased dramatically. It became one of the most popular courses in the elective courses, but the teaching of this course is not so. Most of VC++ courses teaching still stays in the classroom and experimental teaching stage. The main problems include: (1) Students pay attention to the textbook knowledge often more than the practical exercises, on account of the knowledge of textbook more miscellaneous and the teaching of teachers focus on theory. (2) The textbook examples are often aimed at a certain point and teaching of teachers does not provide a comprehensive instance, resulting in the weakly comprehensive design ability of students. (3) The design of experiments lack of attention to the innovative ability of students. Students tend to completely under the arrangement of the teacher doing the experiment, restricted the openness and innovation of students. (4) The teaching objectives attach importance to personal ability, but ignored the team communication cooperation ability. Now, a lot of colleges and universities have realized that the combination of VC++ theory and project teaching model can effectively solve the above problem [2-6]. In the actual teaching process, we combine the course characteristics and students' actual situation proposed and implemented a hierarchical level project-driven teaching method.

3. Hierarchical level project-driven teaching method

Project driven method is derived by the constructivism learning theory, which putting forward by the famous Swiss psychologist Piaget. With this method the teaching steps developed according to a concept of project. The related knowledge associated with each link of project hierarchically. In the project driven, students achieve the purpose of learning knowledge and cultivating ability through the problem solving of autonomous, using the necessary learning resources and with the help of others [7, 8]. Hierarchical level project-driven teaching method is on the basis of project, learning from the knowledge base, learning ability and reality condition. It integrate the projects, teaching goal and teaching content in different stages and levels using suitable project tasks. In this way we have changed the traditional pattern of teacher guide the project progress to the new mode dominated by student project progress mode. In the aspect of teaching we emphasize task driven to mobilize the learning enthusiasm of students fully. Students complete the project design and production process independently. The structure of hierarchical level project-driven method as shown in Figure. 1. The main process is as follows.

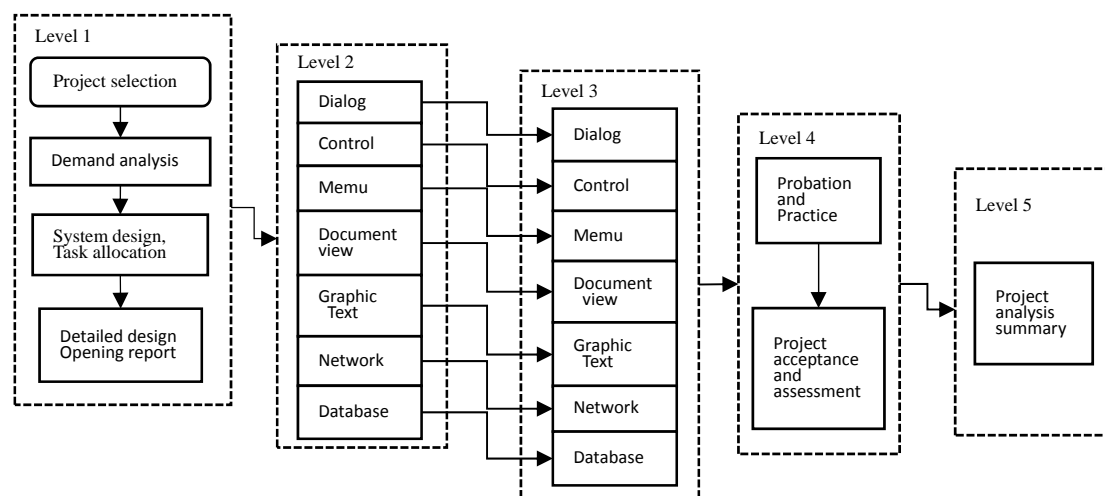


Fig. 1. The structure of the hierarchical level project-driven teaching method.

Level 1: Project selection and demand analysis

Teacher put forward mission requirements based on the role of VC++ program design course in the professional curriculum system of students. Students generated a system design document through in-depth understand and analysis of project requirements. This document include the outline of system, system function modules, and the design of software system, which including the basic processing procedure, organization structure, module partition, function distribution, interface design, operation design, data structure design and error handling, etc.. In order to guarantee the demand of software fully allocated to the whole software according to the system design report.

Level 2: Modular teaching content

We teach the theoretical content of VC++ program design according to the modules, contained the principle of each module, the basic method and the extended learning method. In the teaching process, teacher should interact with students as much as possible in order to inspire students to think for the knowledge and cultivate the ability of autonomous learning. To help students the essence of knowledge, teacher should give examples as much as possible. Organization of teaching must assess link close links with the experiment and project design.

Level 3: The low-level function implementation

The experiment process closely related to the projects. Students began coding specific program according to the design requirements on the data structure, algorithm analysis and module implements of software system design. So as to complete the low level functions on the target system, performance and interfaces of the overall framework and basic functions of software project. In the experiment process teacher should communicate with each student to deal with the difficulties encountered in the experiment

Level 4: The high-level function implementation and software testing.

In the high-level software function coding phase, students complete all functions of each module so as to realize the function of the target system on the basis of experimental results. In terms of the standardization of the development process, coding up to no more than 1/2 in the whole project process, usually in a third of the time. To avoid individual small module affected the whole progress, students should pay attention to coordination and collaboration between different modules when coding progress. Software test is also a very important step in the project development after the program coding completion. There are many kinds of software test methods: According to the test execution, they can be divided into internal and external test methods; According to the testing range, they can be divided into modules and the overall alignment; According to the test conditions, they can be divided into normal operation condition testing and exceptions; According to the test input range, they can be divided into full coverage testing and sampling test.

Level 5: Project acceptance evaluation and analysis

After the project completion, teacher evaluate the project according to the result of explanation and demonstration of project by the project team. Project analysis based on the structure and function module of project. The analysis regards project implement as core, taking the student as the main body. In the process of the project analysis, students could review and learn at the same time. They could consolidate all the knowledge in the teaching target and give full play to subjective initiative and creativity.

4. The characteristics of hierarchical level project-driven teaching mode

4.1 Learning scene is authentic

The project-driven teaching method around the activities of gain knowledge of students, based on real

specific project according to the situation of demand, so that students gain experience in the personal experience and education activities.

4.2 Learning content is comprehensive and open

Project-driven teaching method is comprehensive and extensible whether the problem large or small. It combines theoretical knowledge and practical operation in a project. The problems in the practice could analyze from a variety of angles, which are changing and developing.

4.3 The way to learn is diverse and collaborative

Project-driven teaching method is implemented through practicing, learning, discovering and cooperation. So a lot of learning content will be in the form of self-study. Students get the opportunity of implement innovative achievements through in-depth understanding and researching.

4.4 Creativity of teachers

The study enthusiasm of students could be stimulated greatly if teacher implement project-driven teaching method correctly. So as to students could complete the project of high quality.

5. The effect of implementation

We implemented the hierarchical level project-driven teaching method in VC++ program design course. The number of students in this class is 78, which is divided into 13 project teams, each project team has 6 students. The result of completion of the projects for each team as shown in Figure. 2.

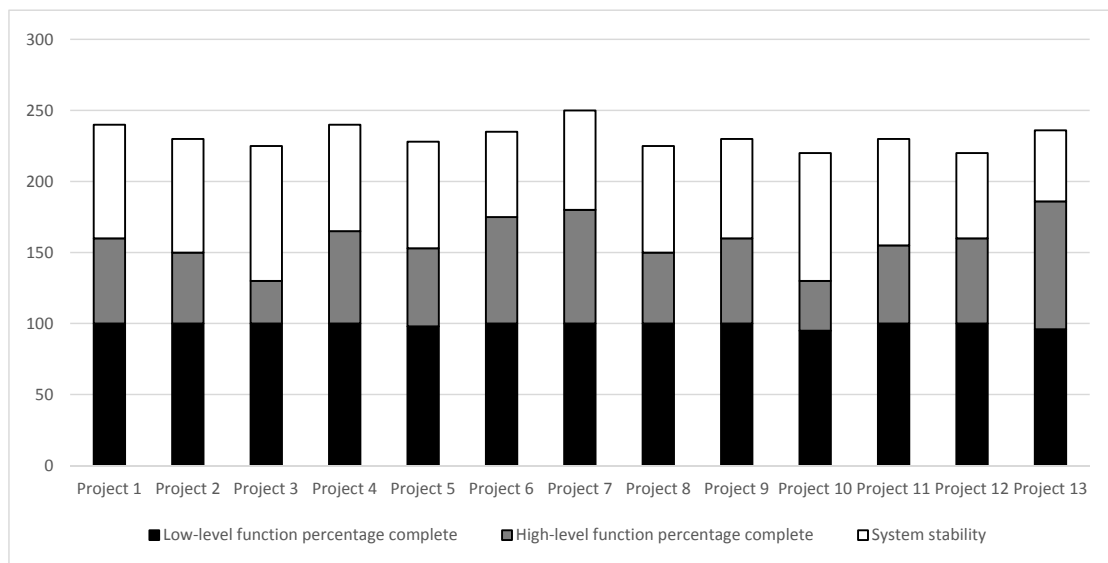


Fig. 2. Implementing status of projects.

All of 13 teams can be completed the low-level function of their project and the completion rate no more than 95 percent. But most of the teams were not fully complete the high-level function of project from the perspective of the result of test. The stability of the software are slightly insufficient. It means that more than 90 percent students have mastered the basic way of using the VC++ program, comprehended the framework structure of MFC and design thinking, and could solve the problem of general application take advantage of VC++ program. More than 50 percent of the students have been able to flexible use MFC to solve the problem of complex applications.

6. Conclusions

Hierarchical level project-driven teaching method is a novel method. It integrated the advantages of both hierarchical teaching method and projects driven method, which effectively improved for traditional project-driving method. The main body of project-driven method from teachers to students, so as to stimulate the autonomous learning ability of students. In this way, students could meet the need of society, more actively in the face of competition and play to their creativity in learning. Hierarchical level project-driven teaching method add the scientific research and innovation of thought to the curriculum and transform the traditional passive accept knowledge form into active seek knowledge. In order to solve the problems effectively such as out dated contents, simple form and stiff teaching. In short, hierarchical level project-driven teaching method is regarded as a kind of new method suitable for applied talents training.

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