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Construction and Research of Object-Oriented Programming for Software Engineering

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***Abstract*—For the software engineering major, we have focused on the "Object-Oriented Programming" course. We have comprehensively designed from the orientation to the course objectives, updated the course content, and redesigned and defined the practical teaching links. This course adopts standardized teaching methods; it combines two parts of structured and object-oriented programming to meet the needs of software engineering training objectives. The course construction has achieved good results.**

Keywords—software engineering; object oriented programming; pratical teaching; course objectives

I. INTRODUCTION

The course of "Object-Oriented Programming" covers two parts: structured programming and object-oriented programming. The classroom theory teaching part is divided into 13 chapters, which takes about 48 hours, of which the structured part has 6 knowledge modules and 18 hours. The object-oriented part has 7 knowledge modules and 30 hours. The major knowledge modules and their order are as follows:

The focus of this course is to master the basic methods of programming and the process of programming, master the basic theory of object-oriented, and establish object-oriented programming ideas. In the actual teaching process, the difficulty of students learning this course lies in pointers, citations and dynamics. Storage management, polymorphism, etc.; in order to enable students to better grasp the content of the course and achieve the purpose of teaching, in the teaching process, we have taken the amount of time to increase the relevant chapters, strengthen the guidance of the internship session, organize students Discussion, use of multimedia teaching methods to increase classroom program demonstrations and other effective measures, so that students can have an intuitive and comprehensive understanding of the relevant issues.

II. DESIGN THOUGHTS AND EFFECTS OF PRACTICAL TEACHING ACTIVITIES

"Object-Oriented Programming" is a very practical course. In the spirit of intensive teaching and practice, in order to cultivate students' practical ability, we will have some of the premise that students have sufficient time. The actual project features of the engineering application are carefully divided into experimental projects. At the end of the course, under the guidance of the teacher, a series of experimental projects are integrated to form a complete project software, which stimulates students' interest in learning and fully mobilizes students' learning initiative and Creativity, the cultivation of innovative ability and the improvement of practical teaching effects.

1. Combining the actual characteristics of our school, the experimental topics are based on typical engineering application problems, and the experimental content of the course is divided into two levels:

The first level is the basic language knowledge point training, which mainly enables students to master the basic development and debugging techniques of programs under the common integrated development environment, and to consolidate the knowledge points learned through program verification and program writing.

The second level is capacity training. Decompose some typical practical projects with engineering application characteristics into several modules, solve one or two small problems in one experiment, and train students to use professional knowledge to discover problems, think problems, analyze problems and solve problems. The ability of the problem.

2. In order to encourage students to fully utilize their innovative and hands-on skills, we have established an extracurricular interest group to conduct open-ended innovation experiments, mainly organizing students for research and development in data management, business flow management, graphics processing, and game development. Conduct group discussions outside the classroom to stimulate students' interest in learning, and promote the cultivation and improvement of students' teamwork spirit and development ability.

100% of the students we have taught so far have completed the experimental projects listed in the outline.

The results show that: heavy foundation, strong practice, and outstanding ability assessment can more fully mobilize the enthusiasm of students' learning, and

have obvious improvement in teaching effects and students' comprehensive application ability.

III. TEACHING EFFECT

"Object-Oriented Programming ("The course reform process and new teaching methods have been affirmed by the relevant teachers of the school, and have been well received by experts inside and outside the school, and have exchanged teaching experience with brothers and universities many times. Students are "object-oriented" The teaching of Programming has also been highly evaluated.

Through the lectures and evaluations, the experts in the school believe that the textbook theory system of the "Object-Oriented Programming" course is perfect, the knowledge points are comprehensive, and the staffing structure is reasonable. The lectures are standardized and vivid, and the theory is connected with practice; the teaching methods are advanced, the teaching methods are diverse, and the multimedia teaching is actively promoted; the idea of solving practical problems is used as the entry point for teaching, and the experimental teaching is carefully organized and implemented in close connection with the practical problems of engineering applications.

The purpose of teaching is clear and the results are remarkable. The experimental teaching was meticulously organized and implemented. Through the construction, the students benefited from the project, and the requirements for the construction of the excellent curriculum were reached. They are willing to recommend the course to participate in the selection of provincial quality courses.

The design of the course content can introduce the latest teaching reform research results into teaching. From the content of the teaching materials to the lectures in the classroom, the emphasis is on international integration, and the idea of solving practical problems is used as an entry point for teaching.

An efficient assessment system must be established among all teachers and students who have truly updated their educational concepts. It is a comprehensive expression of the overall level of the school and the ability to cultivate talents. Technical route: First, the system is built and penetrated throughout. It is necessary to carry out the reform and overall construction of the key aspects of each assessment through the whole process of talent cultivation and evaluation. To solve the shortcomings of the previous reforms, such as system failure, limited footing, single path, small coverage, and a lifetime of examinations, to achieve breakthroughs throughout the main line, full penetration, full participation, and all benefits. The second is multi-dimensional interaction, the main body of students. Focusing on the assessment of innovation ability, the disciplines are open and orderly, and interact with students and extend the assessment through “conditional facilities opening, scientific research process experience, scientific and technological resource transformation, academic atmosphere”; overall curriculum optimization, through “curriculum system reform, curriculum resource construction, experiment Teaching reform, method and method update” interacts with students and extends assessment; teachers actively invest and interact with students through “innovative classroom teaching, science and technology project instructors, excellent model demonstrations, scientific research experience guidance”; students are prominent, through “interests Do-it-yourself, flexible personality selection, self-system planning, independent and independent practice “implementation of innovation ability assessment. The third is the combination of soft and hard, and the system advances.

Implementation steps: While establishing a series of management systems and operational mechanisms such as “Innovation Assessment System” and “Innovative Education Base Operation Mechanism”, we will comprehensively improve the construction of teaching laboratories, open an innovative education base, and provide a high-quality hardware platform for students' innovative practice. (1). Establish an innovative design laboratory and school-enterprise cooperation joint training base: Introduce the enterprise, introduce the project, explore the new model of experimental innovation teaching assessment, and evaluate the project to improve the students' ability to practice. (2). The implementation of the formative assessment of practical teaching in the practical semester: broaden the significance of the construction of experimental innovation bases for school-enterprise cooperation, reform the practice mode of the second practical semester, and establish an assessment model for school-enterprise cooperation. (3). Establishing an innovative practice project assessment: Under the school-enterprise cooperation model, we will strengthen close cooperation with large IT companies in Zhejiang Province and strengthen the practical teaching evaluation of the curriculum. (4). Open laboratory management of innovative laboratories: using information technology and computer management technology, establishing an open laboratory management system, and completing the establishment of open laboratories such as multi-core programming innovation laboratories, thus realizing dynamic and open management of experimental course teaching. (5). Promote the reform of the international assessment system for computer engineering technology courses: to develop students' ability to survive in an international and multicultural social work environment. (6). Form a complete syllabus and network assessment platform that is in line with the innovation practice ability training system.

IV. MAIN FEATURES AND INNOVATIONS

The practice teaching organization closely focuses on the solution of practical problems in engineering application, and pays attention to the cultivation of

hands-on ability to highlight the characteristics of training applied talents in our school. We decompose some typical application management systems into experimental projects, which runs through the beginning and end of experimental teaching. Taking the cultivation of students' ability as the leading direction and implementing the three-dimensional practical teaching, the experimental content is divided into two levels. The first level is the basic language knowledge point training, which mainly enables students to master the basic development and debugging of the program under the common integrated development environment. Technology, through program verification and programming, to consolidate the knowledge points learned. The second level is capacity training. It decomposes some typical practical projects with commercial characteristics into several modules, solves one or two small problems in one experiment, and trains students to use professional knowledge to discover problems, think problems, analyze problems and solve problems. Ability.

The teaching methods are diverse, focusing on the cultivation of innovative abilities. This course adopts diversified teaching methods and methods. With the help of multimedia teaching methods, it strengthens students' theoretical study and comprehensive quality training, and has achieved remarkable results in practice. The teaching process of this course emphasizes the autonomy of students' learning, establishes after-school interest groups, and conducts extracurricular discussions. It organizes students' research and development from data management, business flow management, graphics processing, game development and other aspects to stimulate students' interest in learning. To cultivate students' teamwork spirit and improve the teaching effect.

V. CONCLUSIONS

At present, the teaching content of such courses in domestic colleges and universities generally focuses on the teaching of computer programming languages, that is, it pays great attention to the introduction of basic statements, grammar and some details of a certain programming language. In this way, this type of course is basically based on the language itself system. Since teaching is not based on how to apply programming tools to solve practical problems, it does not put the idea of programming problem solving in the main position, and it does not explain how to analyze and solve problems. As a result, the students are deeply immersed in scattered and grammatical knowledge points, resulting in insufficient programming ability, which means that students are not allowed to conduct research and research. As a result, many students feel that the content is boring and difficult to learn while studying. After learning, they cannot use it to effectively solve practical problems.

We believe that for college students in the information field, it is not enough to master only the programming language. It is important to master the programming ideas and good programming habits to solve practical problems, and to have the idea of using computers to solve practical problems. ability. In this way, it is not just to learn the programming language itself, but to broaden the thinking and lay a foundation for thinking. With this foundation in place, learning the various language tools will have practical uses, and will be easy to attract interest in learning, and can use programming languages as a tool to implement your own ideas and solve practical problems. At the same time, it also enables students to be more motivated in the follow-up courses and even higher research activities.

The teaching work of this course is based on the above teaching philosophy and carries out teaching reform. Compared with similar courses, the teaching methods, teaching methods and teaching effects of this course are in an advanced position.

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