Teaching Reform of Object-Oriented Programming

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Abstract. Aiming at the problems in the teaching of object-oriented programming course, we clearly define the teaching objectives of the course, and make the teaching contents simplified, integrated and optimized. Through the combination of practical and interesting course cases, practice instruction manuals and teacher-student interaction, the frustration in the learning process is reduced and the learning process is improved. Various teaching methods are applied, and the course assessment mechanism is improved to stimulate students' independent learning motivation, promote learning interest, so as to achieve the training goal of the course.

Introduction

Object-oriented programming is an important professional basic course for computer related majors, and plays an important role in the teaching plan. The purpose of the course is to enable students to master the basic concept and thinking mode of object-oriented, to master the expression and implementation methods of object-oriented ideas, to be familiar with the popular object-oriented design and development environment, to cultivate strong software development ability, and to lay the foundation of algorithm programming and software development for the following courses.

With the rapid development of software technology, it is an important task to strengthen the practical ability of students. It is an important way to study the corresponding teaching mode according to the training objectives and the characteristics of students. At present, there are still some problems in the course teaching:

1) The teaching method is single, and students lack interest and initiative in learning. In the current teaching method, teachers talk more and students do less, so it is difficult to stimulate the initiative of students, so it is lack of motivation.

2) The lack of connection between teaching content and practical needs leads to dullness. There are many teaching contents, a large amount of knowledge, and it is difficult to choose between them. In the teaching process, it is easy to cover all aspects, so that the key points and difficulties are not prominent, and students have difficulties in understanding.

3) Practice does not play a sufficient role. Programming courses are all with strong practicality and applicability. The cultivation of programming and development ability requires a lot of practice. In this process, students will encounter a lot of problems. If they can't be solved in time, they will feel more frustrated and lose their confidence and interest in learning [1].

4) The course assessment system is backward, so it is difficult to give full play to the function of encouragement, feedback and guidance. The traditional examination method is mainly closed book examination, which is difficult to test the students' programming ability and software design thought in a short period of time. It also makes the students easy to cope with the course examination, which leads to the deviation from the main line of application ability training. However, the pursuit of exam oriented ability also destroys the students' spirit of exploration in finding problems and leads to the lack of motivation in learning.

In view of these problems, we closely adhere to the course goal of programming practical ability training, streamlines and optimizes the teaching content, improves the course assessment mechanism with a variety of teaching methods, and applies it to the course teaching reform, so as to improve the learning process, improve students' learning motivation and interest, and thus achieve the training goal of the course.

Ideas and Ways of Course Teaching Reform

Teaching Objectives of the Course

Based on the current industrial development and workplace demand, as well as the orientation of training application-oriented talents in our university, the teaching objectives of object-oriented programming course are determined as follows: understand and master the basic principles, analysis methods, design and development technologies of object-oriented, have a preliminary understanding of large-scale software development, and be able to independently and skillfully use C + + language to design and develop small-scale object-oriented programs, have good abilities of independent learning, communication and cooperation, analysis and problem-solving, and lay a foundation for the research and design of follow-up courses and large and medium-sized application software.

Ideas of Course Teaching Reform

On the whole, with the help of various ways and forms to reduce the difficulty of learning, through the integration and optimization of teaching content, combined with the teaching method of course cases, to enhance students' interest in learning and effectively improve students' practical ability. Specifically, we can reduce the burden of learning by simplifying and integrating the teaching content and elaborately designing the key and difficult points; reduce the frustration in the learning process by case teaching, guidance of practice guidance manual and strengthening the interaction between teachers and students; strengthen the incentive role of course assessment and enhance the interest of learning by reforming the course assessment method and focusing on the evaluation of practical ability; finally, through the effective organization of course practice and the implementation of course reform measures, we can achieve the training goal of practical ability.

Ways of Course Teaching Reform

For teaching content, we follow the principle of "taking the basic theory as the center, the application as the teaching focus, and the specific case teaching as the starting point", carefully design the lecture and experimental content, highlight the application focus of the object-oriented method, and introduce the practical problems or engineering cases, not only to ensure the breadth of knowledge coverage, but also to promote the depth of important knowledge points, so as to let students master object-oriented technology better in the limited class hours [3]. In addition, we should further enrich the documents and video materials of practice guidance, so that students can get guidance anytime and anywhere in the process of practice, with less twists and turns, more fun of success.

For the teaching method, case teaching method is the main method, combined with project teaching, task incentive teaching and heuristic teaching. We should pay attention to the combination of scientific research achievements and practical teaching in contents and forms. Through the effective transformation of scientific research projects or engineering cases into teaching contents and experimental teaching resources, we can gradually guide students to analyze, discuss and summarize practical problems, and improve their ability of understanding, analyzing and solving problems [4]. At the same time, combined with heuristic teaching method, we can guide students to actively study, create opportunities and conditions for students to think, analyze and solve problems independently, and cultivate their self-study ability and innovation ability [5].

For the assessment methods, the task incentive based assessment mechanism is adopted to decompose the teaching objectives into a series of hierarchical course tasks. The types, scores, topics and knowledge and ability points of the tasks are designed in layers according to the teaching objectives and ability training levels, and students are encouraged by means of assessment, awards, points and rankings to explore their own tasks. In the process of carrying out the tasks, they can grasp the knowledge points and the skills, so as to ultimately achieve the goal of teaching and training [2, 6].

In addition, through the application of information technology, we should give full play to the functions and advantages of online course platform and Wechat, so as to maximize the space for teaching and practice. Through the network course platform, we can provide various teaching

resources to meet the learning needs of different levels of students, and improve the quantity, speed and accuracy of students' access to teaching information. At the same time, the course Wechat communication group is set up for multi-directional information exchange between teachers and students, students and students, as an effective means to assist in answering questions and conducting thematic discussions.

Reform of Teaching Contents

As the object-oriented programming language used in the course, C++ language is quite complex, so that students tend to fall into grammatical details and ignore that the main goal of the course is to learn the idea of object-oriented programming. Therefore, the key points and difficulties of the course should be clarified so as to make students grasp the main problems, go beyond the grammar level, and focus on the object-oriented programming method. The C++ grammar system is very large and complex, but for some features that are not often used, according to the principle of practicality, they can be completely removed to reduce the learning burden of students. The following directions should be highlighted in the simplification, integration and optimization of teaching contents:

(1) Focusing on the cultivation of programming ability. The key and difficulty of teaching should be programming rather than grammar, which only serves to describe algorithm.

(2) Focusing on the object-oriented method. C++ is developed from the process oriented C language, which is not a pure object-oriented language like Java language. It is difficult for students to accept the idea of the process oriented and then smoothly move to the relatively complex idea of the object-oriented. We should try to combine the both organically in the teaching contents. In C++, parts of the process oriented programming can start from C language, and gradually extend to C++ in comparison and expansion. However, the concept of the object-oriented must be introduced as early as possible to enable students to learn object-oriented programming when they enter the substantive stage of programming ability training. We should focus on cultivating students' ability of abstracting classes from objective things, especially abstracting reasonable and usable classes, which is the most basic and important ability of object-oriented programming.

(3) Focusing on the practicality of contents. The key points of training are students' programming ability, as well as the analysis and design ability of development projects. It should be avoided that the teaching content is only about grammar explanation and examples, and the examples are far from the actual project. We should abstract examples from practical projects, analyze the problems, design solutions, and write programs. In this process, program design ideas will naturally permeate students' minds, and grammar rules will be no longer the barrier to solve problems.

(4) Highlighting interest. With interesting and typical cases, knowledge points will be displayed in front of students, and students' interest in learning will be cultivated, so that students can have fun in solving problems and learn knowledge in the process of happiness. For example, when teaching circular sentences, calculate the scores of competitors; for functions, give the Tower of Hanoi game; in class and object teaching, develop poker game program, etc.

Reform of Teaching Methods

(1) Using case teaching method throughout the teaching process

In the teaching process, theory and practice are closely combined, teaching content is closely related to life, interesting and meaningful typical cases, so that students are interested and have fun, and finally master the corresponding basic theory and professional knowledge, and more adapt to the development process of object-oriented programs as soon as possible. The selected case program should be typical, comprehensive and extensible

According to the exploration process of "phenomenon, problem finding, problem analysis, problem solving, verification", case teaching enables students to master the basic grammar, algorithm, design method and application.

Through the heuristic expansion of the example program, the process of the program from small to large, from simple to complex and practical, is revealed, the exploration enthusiasm and interest of the students are aroused, the connection between knowledge and the engineering thought of programming are mastered, and the actual programming ability is acquired.

(2) Adopting project teaching method to enhance students' engineering practice ability

The project teaching method is mainly used in the practice of the course. It organizes teaching in the form of project development group, so that students can participate in and cooperate with each other, encourage students to discuss with each other, express their own opinions, stimulate students' creative enthusiasm and improve together. At the same time, it introduces the theory of software engineering, controls the realization process of each link of development, and cultivates a good and rigorous style of software development, so that students can not only consolidate the theoretical knowledge they have learned, but also integrate the theory with practice and comprehensively apply the theory of each course, so as to lay a solid foundation for future practical work.

(3) Using task incentive method to improve students' interest and motivation in learning

Task incentive method is to transform learning objectives into a series of practical tasks, in which special training and comprehensive application of knowledge points are embodied. Task is carried out layer by layer, which is innovative, comprehensive and practical. Task incentive teaching is carried out according to the process of "arrange tasks, study corresponding knowledge points, practice, check", to let students learn knowledge and solve problems with purpose, so that they feel that programming is no longer a very difficult thing, but a real thing. As long as they study hard, they can independently development software system. Because of the practical value of case tasks, students are easy to find a sense of achievement and have more confidence in learning.

The key to the application of task incentive method is that the task or project should be designed reasonably, with hierarchy, practicality and interest, which will directly affect the teaching effect. Firstly, we should implicate each teaching key point in the practical task. The task are usually designed to attract students's interest, and guide the students to turn the theory in the book into a living application through the instruction of the teachers, and know by analogy. Secondly, the task should conform to the characteristics of students, such as the existing knowledge, cognitive ability and interest of students. Different students have individual differences, and their ability to accept knowledge is not the same.

(4) Reforming the assessment method, and focusing on the process assessment and the test of practical ability

The assessment of the course is dedicated to making a comprehensive evaluation of students' knowledge, ability and quality. We should adopt flexible scoring methods according to the course characteristics, teaching objectives, teaching difficulties and task types.

For assessment content, the course objectives are integrated into a series of practical tasks, and the attributes of each task, such as required or optional, time, score and requirements, are set. These practical tasks fully consider the integration and comprehensive application of knowledge points, embody factors such as knowledge, ability and quality, and meet the needs of students with different learning abilities at different levels.

Each practical task is carried out in the form of homework or project, and is scored in the way of reply acceptance, i.e. score is given according to the explanation, question and answer combined with the completion quality. Through the development of practical tasks, we can evaluate the students' ability to analyze and solve problems in the process of completing the tasks, so as to achieve a comprehensive investigation of students.

Each time the students complete the task, they will directly increase the scores on the comprehensive score. The teacher will give the scores and comments on the completion of the task, and can update the scores and rankings in real time through the network teaching platform, explain the problems in the report and reply in time, and make corresponding adjustments in the teaching. Students can query score ranking, task completion performance and learning suggestions given by teachers according to task completion in real time. The current score points directly reflect the

comprehensive score of the course, and urge students to adjust the task selection and learning process according to the score situation, so as to play an incentive role.

Finally, the comprehensive score of the course is composed of class discussion, attendance, practical tasks, final test, etc. according to a certain proportion, where the proportion of usual performance is increased, the investigation of learning process and practical ability is focused. In addition, a certain score value is set to add points for students with innovation and independent opinions, so as to introduce the factor of innovation ability into the score structure. In order to improve the incentive effect of the assessment, each component of the score is directly designed as the score of the centesimal system, instead of being converted in proportion when calculating the comprehensive score of the course at the end of the term, which makes the students feel more real about the score and easier to obtain the sense of achievement.

Summary

The course of object-oriented programming plays a connecting role in the professional curriculum system. It guides students to gradually form strong practical ability of object-oriented programming and development and good engineering quality in the whole process of using object-oriented technology and methods to solve problems. In view of the problems existing in the current course teaching, we have clarified the teaching objectives of the course, simplified, integrated and optimized the teaching contents to reduce the difficulty of learning. Through the practical and interesting case teaching of the course, the guidance of the practice guidance manual, and strengthening the interaction between teachers and students, the frustration are reduced and the learning process is improved. We also have combined various teaching methods and improved the course assessment mechanism, so as to strengthen the evaluation of learning process to stimulate students' independent learning motivation, and really promote their interest in learning.

Through several years of teaching practice, the students' ability of software design and technology realization has been improved significantly, as well as in the aspects of team cooperation and communication, which is more in line with the talent needs of software enterprises. It shows that this teaching mode plays a good role in improving the teaching effect and cultivating talents in line with the needs of engineering practice.

Acknowledgment

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