The Research on Practice Teaching of Programming Courses

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Abstract. Practice teaching plays an important role in training students' practical ability and innovative ability. This paper analyzed all the factors that restrict the students' practical innovation ability training in programming design based on the teaching content, teaching methods and evaluation system. In order to develop the students' ability of programming theory and programming ability, and to stimulate students learning polarity and strengthen the practice capability, we carried on some reforms and practices on every aspects of teaching contents, teaching methods, evaluation form and the online teaching resources platform construction, etc. After several years teaching practices, we get the conclusions that the reforms can improve the programming course teaching quality and students' programming ability, so we gain a better teaching effect.

Introduction

The program design course, including C, C++, Java, Java EE, .NET, is an important curriculum group of computer science and technology. These courses run through the whole college life. For these courses, the students are not only required to master high level programming language, and more important is to training them to master program design ideas and methods gradually in the process of practice, and finally to cultivate students the ability to solve practical engineering problems. So these courses mainly focus on cultivating students' innovative spirit and practice ability and practice teaching is an important teaching parts. When learning these courses, the students are required to take part in the inquiry-based learning activities, to verify the algorithm design debugging, so as to master the basic abilities in errors finding and debugging during programming\cite{1}.

The effect of practice teaching not only affects the students’ understanding and grasping to the program design idea and method, it also affects the students' motivation in the follow-up courses and confidence. How to improve the teaching efficiency of program design course, how to develop the students' ability of thinking way and programming in practice teaching are problems need to be solved urgently. Using experience in program design course teaching in recent years, we carried out several reforms including the teaching contents, teaching methods, examination form and online teaching platform construction, and achieved some better teaching effects.

The Problem Analysis in Programming Courses

The Improper Teaching Contents

In program design course, there are more knowledge points, the coverage is wide, so it is more difficult to let students trying to master all the knowledge in a limited time, so in the past there exists some problems about the unreasonable choice of teaching contents and time arrangement in the teaching process. At the same time, the existing teaching contents lack the introduction of new theoretical method of object oriented programming, and can't meet the needs of high-quality personnel training.
The Monotonous and Old Teaching Methods

In order to complete the teaching contents in the limited class hours, the teacher often with the aid of multimedia tools. Due to the lack of interaction between teachers and students, the teaching contents become more abstract, boring, and unfavorable to the cultivation of students’ creative thinking. In addition, teachers emphasis on the interpretation of individual knowledge points in the teaching process, and ignores the relationship between the knowledge points, so usually lead to the students’ comprehensive ability is very weak.

Influenced by traditional programming courses, the courses experiment can only did in laboratory, the experiment time and places are limited to a large extent. Of all the experimental projects, the verification projects account for a large part, and lack of designing and comprehensive experiments. Generally teacher needs to guide so many students at the same time, so the teacher is difficult to solve all the problems students met. Because some students’ self-control is poor, once the problem can't be settled in a timely manner then they will copy homework, thus will not improve programming ability effectively.

The Unreasonable Evaluation Way

The assessments of most programming courses adopt a final exam mode. But in fact the program design itself is a kind of practical work, the traditional examination way can test students' basic concepts, basic syntax, and it ignores the appraisal of students' comprehensive ability, hindered the cultivation of scientific thinking and innovative ability. So there is a strange phenomenon: students get good marks do not have the ability to write a real program, some students who got lower marks can have a certain programming ability. In other words, results of examination are not the same as programming ability. In fact, there is no need to remember all the details in one language, when write a program, you can consult relevant documents.

The Reforms of Practice Teaching Mode

In traditional teaching mode which emphasis the language syntax, the programming courses practice mainly includes basic type, knowledge type, verify type experiments, the students’ lack of free creating space in the whole process of teaching. In this mode, the learning enthusiasm of the students can't play and development potential, the students can’t meet the requirements of the society. Aimed at this situation, we reformed program design course teaching pattern, explored the methods to cultivate students' practice ability and innovation ability, which includes the following several aspects [2].

To Adjust the Teaching Contents

In order to solve this problem, we reformed the practice teaching content, that is, reform from simple, validation experimental types into a comprehensive and design type of project practice. In the concrete implementation there are two ways: first, decompose the content of the project practice in each course unit. For example, in Java program design and .NET program design course, respectively, we design two projects, one is "student information management system", the other is "Online Bookstore"; students do these two projects in the practice teaching. Second, we set up some project practice courses, such as "Java Web programming techniques", "NET project practice ". Through the comprehensive and design type of project practice, the students get the interest and enthusiasm in the overall grasp the system building and design ability, project requirements analysis and design ability, testing, maintenance ability and team cooperation ability are all get rapid improved.

To Arrange the Teaching Process

Follow the understanding rules from simple to complex, from easy to difficult, we designed a 5 progressive steps method in the practice teaching, they are read programs, modify programs, write programs, fill in blanks and comprehensive training. The whole process is task driven.
The first 3 steps, read programs, modify programs and write programs, are the basic ability training. The comprehensive training focuses on the cultivation of comprehensive application ability. In the teaching process, we combined the short-term task and long-term task, to cultivate the students' interest in learning, and to motivate the students' learning enthusiasm. Here, the long-term task is the overall task student must implement in the project, it may, according to the teaching objectives of each unit and the actual system, be decomposed into some short-term tasks.

By using online learning platform, teachers can correct homework online and students can discuss problems with classmates. For example, one student puts forward one question, all the students can see the teacher's answer, so to improve the teaching efficiency. Students can also watch the teaching video, as supplement of classroom teaching and deepening, this changed the traditional way of learning, received good learning effect.

To Reform the Teaching Methods

Traditional practice teaching mainly uses the teachers demonstrating, students imitating, thus the students' interest in learning and active learning enthusiasm is restrained, unfavorable to the cultivation of practical ability and innovation ability. Aimed at this situation, we introduce the interactive teaching method, situational teaching method, personalized homework package teaching method, these methods pay more attention to interaction, close to the real environment.

In the Java EE project course we adopted the interactive teaching method. The method includes the following steps, self-discovery, communication in the group, debate between groups, practice exercises and evaluation summary. Before the starting of the study, the teacher put forward the task ahead of time for each group students, on the basis of students' self-discovery, teacher choose the core part of the project for discussing. The debate between different groups at the same time, can cultivate the students' collective consciousness and competitive consciousness. Through this kind of teaching method, students' interest in learning, autonomous learning and multidirectional communication skills, collective consciousness, and competition consciousness can have great improvements.

In .NET project practice course, we adopted a situational teaching method. Through the cooperation channels between university and enterprise to lead the students go to the enterprise to organize teaching in real environment. We divided all students into several groups, each group consists of 5 or 6 students, each student playing one role of project manager, system analysts, design engineer, test engineer. Doing this can make students familiar with the project development process, understand the role responsibilities. Situational teaching method in company can make students familiar with the work environment of enterprise and talent demands, further cultivate the students' project analysis, design, coding, testing, and team cooperation spirits which is the professional essential ability.

According to students' interests, hobbies and expertise, we assigned to the student individual work packages, including reference resources, project design, project, etc. Work packages can be divided into network programming, program design sub package according to the teaching module. Under the guidance of teachers, according to the personal skills proficiency, hobbies, and the direction of the future preparation in selectively students pick up technical data from the teaching package and learning autonomous. We called this method as personalized homework package teaching method.

Improve the Evaluation Mechanism

The assessment is an important measure to evaluate students' learning effect, students' learning achievement, at the same time the assessment is also a process of cultivating the ability of assessment process. To further arouse the enthusiasm of students' autonomous learning and creativity, we abandoned the traditional assessment methods to take paper examination, but adopted independent experiment, unit test and comprehensive assessment, online test throughout the whole process of teaching to foster ability as the main assessment methods.
The students do experiment questions according to the experiment guidance and the teachers give some necessary guidance. In this section, the teacher pay attention to training students' independent ability to solve problems, at the same time by asking questions to assessment the ability of students.

Before the end of each experiment course, teachers assign a small task to students, students must completed it in 15 minutes. Students writing, debugging and running the program, and submit the results to the teacher’s computer. This is helpful to improve students’ programming efficiency, cultivating practical ability, at the same time, it can help teachers assess students' learning situation timely.

The comprehensive practice is the main course examination ways. The content of the comprehensive practice can be set by the teachers, it can also be set by teachers and students under consultation to have an open test, allowing students to join a group freely and evaluation results by answer questions. This type of evaluation process can examine students’ learning effect, and can also to promote the students' comprehensive application ability.

In order to guarantee the objectivity of evaluations, midterm and final exams are all machine exam. Examination questions are randomly selected from the question bank. Examination question types include multiple selections, fill in blanks, errors correct and program design. Exam questions are only basic knowledge, if students can grasp the fundamentals of teachers’ lectures, they will pass the exam. After several tests, it has been proven that this form of tests has the objectivity, fairness and stability, a better evaluation result [4].

The Conclusions

We made some reforms and innovations in practice teaching in programming courses, the target is to improve the students' innovation ability, and programming ability. And we get a good result in actual teaching process. Through the practice teaching mode reforms, we greatly stimulated the students' learning interest and enthusiasm, enhanced the practice innovation ability of students significantly, the students' ability of programming and debugging, algorithm analysis and design have increased significantly, promote the study of subsequent course effectively.

At the same time, the teaching pattern reforms and innovations in programming courses greatly arouse the enthusiasm of teachers in teaching reform, improved teachers' teaching and scientific research level greatly, established a core teachers team. The quality of talent cultivation got high appraised by enterprises and societies. But program design course teaching reforms and innovations are systematic projects, which involves many contents, so we still need to continue to work hard in the future, master the rules of programming course teaching and learning, further improve students' ability to solve practical engineering problems.

References


