Discussion on Improving Programming Ability Based on Course Grading

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ABSTRACT: The purpose of experimental teaching in the computer programming courses is to improve students' ability of programming. At present, the Online Judge systems can only give right or wrong judgment to the programs, does not have a higher evaluation function, such as code metrics, error analysis, code plagiarism detection, multi-dimensional evaluation. In this paper, we use the Course Grading platform to solve the above problems and hope to provide reference for the experimental teaching of the programming courses.

1 INTRODUCTION

In our country educators pay more and more attention to experimental teaching. since 2006, the Ministry of education has approved the establishment of 900 national experimental teaching demonstration center and 300 virtual simulation experimental teaching center, the construction of these centers has been promoted the laboratory construction of colleges and universities and pushed forward the reform and innovation of experimental teaching.

In the talent training program of computer major, our university put forward to cultivate students' thinking ability, learning ability, information ability, innovation ability, practical ability and expression ability. Practical ability refers to the skills of experiment, operation and investigation, learning to use the methods of mathematics, science, technology and engineering design, then put forward the basic plan to solve the problem of military experiment.

The content of computer programming courses is very abstract, involves a lot of algorithms and theory. In order to master these courses, students must have strong theoretical analysis and logical thinking ability, at the same time the programming courses themselves have strong practicability and application, which requires students to have strong experimental ability of analyzing problem and solving problem under the supported by mathematical theory.

How to improve every student's ability of programming is the problem that we have been studying. Some of the traditional methods (computer rank examination, online judge systems, etc) can only give right or right judgment to the programs, does not have a higher evaluation function. A lot of new students do not understand the compilation report, others do not know how to improve the performance of the program. So we pay more attention to the problem of how to measure the code, analyze the errors automatically, detect the plagiarism among students, multi-dimensional evaluation and so on. This paper discusses how to solve these problems based on Course Grading platform.

2 EXPERIMENTAL TEACHING OF PROGRAMMING COURSES

In the programming experimental courses, we generally proceed in an orderly way and step by step as follows: basic concepts, basic operation, instance validation, algorithm realization and comprehensive application, which closely linked to the teaching, from simple to complex, from easy to difficult to design the process of experimental teaching.

The contents of experiments can be divided into four kinds, which are instance experiment, basic experiment, design experiment and comprehensive experiment. We employ the idea of "reading-imitation-mending-studying". Reading refers to read other peoples’ code, learn the ideas and the fashion of algorithm, understand the ways of thinking to solve problems, this is the start of learning to programming; with the basis of reading, students can imitate to write algorithm, put together acquired knowledge to solve a similar problems; when application scenarios or demand change, students can mend algorithm, make the algorithm the best and deepen the understanding of the knowledge; studying refers to explore the characteristics of problem and find the strategy of
solving problem, it is the highest level to cultivate students' ability and the quality.

2.1 Basic experimental ability

In the stage of reading-imitation-mending, we generally strengthen student's understanding to the program through after-school exercise and Q&A of knowledge point. We provide some instance and basic experiment for students in the experiment teaching, instance experiment is link to read and understand the basic algorithm and complement the program; basic experimental is link to read and simple imitation, complete some experiments to verify whether the right or not. In this stage, students feel difficult to implement program, because these programs usually not complete programs, firstly they must understand the program and then fill the procedures. Without the main procedure, students are hard to compile this fragment directly, the Course Grading provides program fragment programming, which is a good solution to this problem.

In the current programming environment, compile system usually test program by black box, students are often difficult to understand the compilation report, especially for beginners. Sometimes the compiler passed but the result is a mistake, students cannot understand where is the wrong, Course Grading provides the detailed program evaluation report, to enable students to understand the error point, let the students quickly locate and modify the error, enhance students' confidence in solving problems. Course Grading also provides some algorithms visualization to further understand the algorithm.

2.2 Promoting experimental ability

After entering the stage of studying, program design topics are generally applied subject and open question, students need to analyze the problem and extracted each module to complete each function, that is, project operation stage. In this stage, we manage the process in accordance with engineering practice-"division of labor-cooperation-discussion-summary-reporting".

We generally partition students into groups, every group is made up of three members, they form pair programming in every group. Every group students divide the tasks through verbal communication firstly, three students act as the role of the document clerk, programmers and testers respectively, they can switch roles in turn. Through the pair programming, students can help each other and learn from each other, mutual quibbling, mutual supervision, and to develop students' consciousness of team cooperation. At the end of every experimental class, group members must report his team's thoughts and achievements, which train students' ability to expression. At the same time, the power of the group will provide more courage and help to the students who are more shy and not good at answering. But due to all the students do the same project, so inevitably may appear some phenomenon about copy or plagiarism, Course Grading provides evaluation of plagiarism, it not only has code similarity comparison, but also document similarity detection. Course Grading give a detailed evaluation report on the implementation of the program, from the dynamic testing, code static analysis and execution efficiency, enable students to think whether can be optimized better. Finally we can get feedback from the correct rate of the algorithm and master the difficulty degree of the algorithm.

2.3 Competition to enhance the experimental ability

In programming courses, we encourage students to participate in various programming competition, such as our school "Zhiyuan Cup" programming contest, "lanqiao cup" and ACM national or world competition, which enhance the students' interest in learning and test the students' achievement. In such competition, it not only need to solve the problem, but also hope time consuming as little as possible, which requires the algorithm has superior performance. Course Grading meet our requirements, which evaluate programs through correctness and performance. Through the comparison of the results, students can learn better ways to solve the problem, get new ideas and inspiration.

2.4 Experimental assessment

Experimental assessment contains the usual job completion, the completion of each experiment and the final test results on the computer.

In order to track and record the learning process of students, we use the Course Grading assignments function to assign ordinary work or random assignment to students. Course Grading support rich topic type (selection, fill in the blank, short answer questions, programming, program fragment programming, etc.), the system will give the completion status of each student, this is basics score.

We use evaluation function to check correct rate of experiments and projects, whether to plagiarism and discuss, etc. This is the score to experimental report.

Course Grading also provide the function of generating test paper, which can generate multiple sets of papers in a single field, achieve online examinations and real-time monitoring to students whether copying each other by exchange account, and make real-time evaluation so that students can immediately know their scores, this is final test score.
3 CONCLUSION

The content of computer programming courses are very abstract, students need to have a strong theoretical analysis and logical thinking ability, at the same time, they are also require do many experiment to improve their programming ability. To improve the practical ability is not achieved overnight, we wish Course Grading platform can help teachers improve the effectiveness of management and provide students a whole process of learning and guarantee the students' learning effect.

REFERENCES


