Research on C Language Curriculum Reform for the Cultivation of Computational Thinking Ability

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Abstract: Computer basic education is oriented by computational thinking, which is the general consensus of university education at home and abroad. At present, there are still many problems in the teaching of C language public basic courses in China, which lack of attention to students' professional background and learning needs, and cannot adapt to the diversified and personalized development of students.This paper discusses how to reform the programming teaching of C language based on the training of new engineering and technical talents and discipline integration, and discusses the aspects of teaching content, teaching methods and teaching examples.

Keywords: Computational Thinking Ability Training; C Language Programming Curriculum; Curriculum Reform

Introduction

In today's world, the popularization of computer information technology and the basic computer education with the cultivation of students' computing thinking ability as the core have gradually become the consensus of university education at home and abroad. Computer programming is the secondary discipline in the three stages of computer foundation, computer programming and computer application, which has the role of connecting the preceding and the following.Through the complete programming design language, students can understand how the computer deals with problems, from mathematical thinking to computational thinking, and can use computer programs to deal with practical problems in work and life. C language is a flexible programming language with rich functions. Due to its high execution efficiency, it has always been a necessary programming language for programmers, and it is also a required course for most universities and science and engineering majors in China.

1. C. The teaching status of language courses

Students taking elective courses come from all over the country, and their knowledge level of mathematics and computer theory is uneven. Some started accessing computers in junior high school, and others until college. C Language programming is a subject combining theory and practice, which not only requires students to have a certain theoretical basis of grammar, but also requires students to carry out practical operation on the computer to prove its correctness and operability.Students with great personality differences show different attitudes in the learning process. Some students are willing to accept challenges, willing to study and try constantly trying, while others are afraid of setbacks, are at a loss in the face of mistakes, and lack the ability to solve and correct themselves.

C language programming course for the school of each professional teaching plan, teaching content, teaching methods, but the lack of students 'professional background, learning needs attention, no computer basic courses and other disciplines, professional organically, so that the students' computing thinking ability is effectively improved. It can neither meet the needs of new engineering majors, nor meet the needs of students' diversified and personalized development.In the teaching of C language, attention should be paid to the cultivation of computer thinking ability, strengthen the combination with other subjects, so that students form good learning habits, cultivate and strengthen students' computing ability, independent thinking and problem solving ability.

The combination of theory and practice is not close enough. In theoretical teaching, teachers often pay attention to the grammar rules of C, but C has a large number of grammar rules and limited class limits, teachers do not have enough time to explain how to design and analyze program algorithms.In practice hours, teachers arrange according to the actual teaching content, the teaching plan is compact, and students do not have enough time and energy to digest the knowledge learned. In practice, the direct use of manual programming will make students feel very difficult and gradually lose their interest in C language learning.

2. Curriculum reform attempt for the cultivation of computational thinking

2.1 Diversified teaching content design

C language programming course has two main purposes: one is to understand the computer problem solving method, apply it to work and life, pay attention to the process and method of dealing with problems; the second is to understand the programming methods and ideas, to be able to use C language programming to solve problems. The first purpose is to dilute the laws of grammar and focus on the ideas and methods of solving problems (that is, "computational thinking").The second purpose is to emphasize the programming method, and to pay attention to the grammar rules, which is aimed for some students who have a better mathematical foundation of[1].

In the current course content, it is difficult to notice the specific combination with the selected students, which is difficult to mobilize the initiative of teachers and to think about them deeply. According to the different requirements for C language courses, the teachers can choose different teaching plans according to the students' professional characteristics.For material chemistry, petroleum, storage and transportation, it strengthens students' mathematical thinking ability and computing thinking ability; in the course, the first eight chapters solve practical problems related to course design and implementation; for electronic information engineering and avionics, in the first 11 chapters of the course, and the basic knowledge of programming, calibration, data structure and algorithm is introduced.

2.2 Teaching methods oriented to computational thinking training

Through the cooperation of various educational media, it can effectively promote the development of teaching activities. The teaching group divided and decomposed the knowledge in the course, and made it into "micro-lessons" on the online intelligent tree platform, so that students can learn independently through their mobile phones in their spare time, which is a good auxiliary teaching method.During the "micro class" video, the teaching and research group thought from the following aspects: 1) divided the knowledge points into computational thinking mode, making students master knowledge and computing thinking ability; (2) the knowledge points in each video must be complete, must include some part of the knowledge points, not too scattered, so as not to affect the students' comprehensive understanding of knowledge;(3) All the contents of this course should include all the contents listed in the course syllabus, so that students can preview and review after class. For example, in Chapter 2, "C data Type", three "micro-lessons" videos can be recorded, including "data type", "constants and variables", and "progressive transformations". At the same time, it can also help the students to master the grammar knowledge quickly and systematically.

In the classroom, the teacher should also combine the knowledge points and problems in the class to strengthen the consolidation and expansion of knowledge. In order to meet the needs of "new engineering", the teaching and research group constantly improves the teaching methods, pays attention to cultivating students' ability to solve practical problems and complete the projects, and guides students to complete the homework. In the teaching of specific cases, cultivate students' operational ability:

First, let the students abstract model the problems and analyze the problems to be solved. Secondly, guide the students to transform the data structure model of C language. Finally, guide the students to realize the data structure model with C language programming.[2]

2.3 Practical teaching of strengthening computational thinking ability

C language is a high-level programming language. Only in the continuous computer simulation, continuous coding,

debugging, summary and reflection, can we continuously improve our programming level. By standardizing the teaching process of C language, students can form the habit of thinking ability and program design on the basis of C language. Before each class, arrange homework, let the students analyze the question, and develop the corresponding answer.In practice, the students will have a variety of procedural mistakes, the teacher should give them the correct guidance and assistance, so that they can learn the correct operation steps, correct the grammar and logic in the program.In order to strengthen students' hands-on operation ability, an online homework submission system can be designed to achieve the purpose of automatic proofreading. In the homework submission system, based on the core computing idea, it emphasizes the teaching content based on subject integration, and adds several examples of after-class practice according to different subjects. At the same time, according to different levels of program design, different difficulty examples are designed, so that students can practice independently.

Epilogue

The teaching purpose of basic computer course is to improve students' mathematical thinking. The teaching of C language programming is based on the teaching method of teaching subject, students' passive acceptance and poor learning effect. It adopts the teaching concept of combining "computer programming" and "modern teaching", unifies the teaching objectives with teaching methods and gives full play to the initiative of students in learning.Strengthen the training of students' mathematical thinking, promote the new development of engineering discipline, and provide strong support for the innovation of engineering technology.

References

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