Research on the Teaching Method Based on the Cultivation of Computational Thinking Ability in the Course of Programming

Min Che

Abstract: In the course of computer basic teaching system with the core of cultivating the students' computational thinking ability, the program design course is a core course, and its status is important. How to train the thought of calculation thinking, and how to make the teaching effect optimal, it is worth discussing. This paper puts forward some teaching methods for communication and discussion from the purpose of training students' Computational Thinking Ability and the teaching effects.

Keywords: Computational Thinking, Case-driven teaching method, practical ability

I. Introduction

Computational Thinking was been put forward by the director of the Carnegie Zhou Yi Zhen Department of Computer Science at Carnegie Mellon University (Jeannette M. Wing) professor in March 2006 in the United States Communications of the "Computer Journal ACM" Journal. Computational thinking refers to a series of thinking activities, which cover the breadth of computer science by applying the basic concepts of computer science to problem solving, system design, and human behavior understanding. [1] The course of programming is not only the beginning of students' learning program design, but also has a close relationship with the students' programming conception, the ability of analyzing and solving problems. Through studying this course, it not only enables students to obtain the knowledge of programming design, software development ability, exercise the ability of logical thinking, it is more important to cultivate the students how to calculate

Min Che, College of Science, Air Force Engineering University Xi'an, China
cheminw@163.com
from the angle of thinking to solve practical problems, to improve the students’ comprehensive information literacy. The C language has been recognized as a widely used language.

However, the concepts involved are more complex, grammatical rules are more and more flexible, so it is easy to have errors. It is generally recognized that the course is difficult, abstract and difficult to learn, and also facing a relatively small amount of time in military academies. Therefore, it is necessary for us to enlarge the teaching methods and research efforts on how to achieve the curriculum goals of training students' Computational Thinking Ability with less hours. This paper puts forward some teaching methods for communication and discussion from the purpose of training students' Computational Thinking Ability and the teaching effect after practice.

II Combined with practical examples, Stimulate students interest.

In Psychology interest in learning is the psychological interest and pursuit of learning activities. This trend is the relationship and a certain emotion, it is relatively stable and strong continuity, students are interested in taking the initiative to understand and actively exploring the desire to have, at the time, conquering difficulties and focusing attention longer. Therefore, in the process of teaching, we should pay attention to training students' interest, grasp the excitement of students, and effectively mobilize the students' desire for knowledge. For example, in the C language class, we can offer students for several examples of C programming language with a small game (such as backgammon, Tetris), or graphics animation programming (such as flag, collision etc.), let students feel the charm of C language, so as to stimulate their learning interest. So they have a preliminary understanding of the C language, which illustrates the C language learning to do what, let them turn the passive learning into active learning.

III Reasonable and correct use of various teaching methods

Famous educator said "once the teaching method touches the students' emotional and will fields, and touches the spiritual needs of students, this teaching method can play a highly effective role." The traditional teaching methods usually use classical teaching materials, each part of the course content is explained in detail, and each function and operation are explained in detail. The end result of this method of teaching is to teach students dogmatic use, which does not help to develop their computational thinking ability. How to improve teaching methods, to solve the trivial and boring grammar phenomenon, let most students quickly grasp the basic concepts of the course, the basic skills and application in limited time, is the key problem to be solved. Advanced and reasonable teaching methods can enable students to quickly master the course in a short period of time, stimulate students' interest and love
for the course, and finally realize the cultivation of Computational Thinking ability.

A  Analogy method

Analogy teaching is a kind of teaching method which enables students to better understand and master new knowledge through vivid metaphor (appropriate example of life), which is easy to accept and difficult to forget. Some teaching content of computer in C language is abstract and not easy to be accepted by students and teachers should have the ability to understand, as to simplify, the profound theories speak straightaway, which requires teachers to delve into teaching materials. In the teaching, the examples of life are skillfully used, and the methods of image analogy are most easily accepted by students [2].

B  Case-driven teaching method

Case studying method is adopted to stimulate students' interest in learning. The so-called cases are examples that reflect the content of teaching in daily life. General classroom examples are not equivalent to case studying. Case teaching refers to the teaching method that leads students to analyze and study cases, and enable students to grasp the content of knowledge in order to achieve the teaching objectives. In preparing the case, the teacher should first determine what is the point, what students needs to master, and then select cases, which explain and reflect these knowledge points. In the design of the case, do not stick to the pattern, clever use of visual programming language or Flash animation design software. Do not rigidly adhere to the C language statement format, but should pay attention to the vivid case, image, can really stimulate students' interest in learning. Only stimulate the students' interest in learning, students will consciously and actively memorize the sentence format of C language.

As in the choice of teaching structure selection in multi structure, using the VB programming language to design a traffic light automatic change the case, to enable students to master the multiplex structure, more important is to enable students to understand the structure of the use of multiple choice. Result shows that in the process of case teaching, students have high interest, large teaching capacity, and close knowledge before and after, and the students have a deep impression on the knowledge they teach through case teaching, and can flexibly use them.

C  Classroom trap teaching method

When the presentation or demo code, we deliberately put the typical and error prone code wrong to set the trap, the program debugging cannot pass, and attract the attention of students, and the students are inspired by teachers under the guidance of correct mistakes, find out the mistakes, get the correct code. Through debugging the program to find a series of errors, correct mistakes,
debugging procedures not only improve the students understanding of the code, the concept, and improve the students writing code experience, improve the ability of debugging.

D Interesting teaching method

Interesting teaching method is from some interesting examples of such as "Fibonacci rabbit" and "buy 100 chickens", "monkeys eat peaches", "Tower of Hanoi", etc. Start with interesting examples, arouse students' interest, and make them complete the teaching of knowledge in the sense of playing games [3]. Through practical teaching practice, this method is very effective.

E Infiltration teaching method

In the whole teaching process, the basic idea of software engineering is skillfully introduced. Computer science belongs to engineering technology science. In order to make students have good programming thinking, we should pay attention to the penetration of software engineering thought. Several stages of the software life cycle, namely the problem definition, feasibility study, demand analysis, outline design, detailed design, encoding, commissioning, operation and maintenance, we can be realized by C program design routine, to cultivate students' programming in engineering thinking. It doesn't take much effort to abstract concepts, but it can cultivate students' good habits of systematic analysis from the point of view of software engineering in programming. Although the problem is small, but the "peep know global", the basic idea of repeated strengthening in problem solving, it will effectively train students in the program design the overall engineering thinking ability.

IV Reasonable design of teaching objectives

Constructivist learning theory emphasizes students as the center, in the constructivist learning environment, teachers should give students learning initiative, let students enjoy hardships and fun in personal practice, and cultivate their ability to operate independently. C language course is a practical course, operation is very necessary, in the computer students can further understand and master the knowledge, many students do not know or do not understand the problem can be smoothly done or easily solved by operating in the process. Do not always ask students to solve the problem step by step, let the students themselves in a purposeful situation, find solutions. The initiative of study is returned to the students, so that they really should be master of learning. In the practice of organizing students on the computer, teachers should appropriately design some flexible homework. For example, after the completion of the cycle structure, you can let students use the cycle to experience the output of character graphics, first of all right triangle, and then to isosceles triangle, and finally output diamond. These problems are difficult to develop in a spiral form. They are independent and intrinsically related. To
these problems, students feel that as long as they can use their brains, seriously thinking, it is a jump up picking the "peach". The measure can maximize the enthusiasm of students motivated to learn.

V Reasonable and objective assessment mechanism

To evaluate the C language course, we should use a variety of means to form a diversified evaluation mechanism. The content of examination should be mainly operational skills and theoretical knowledge, and its flexibility will be emphasized in time and form. To measure the quality of this course is not whether students know or not, but whether they will do it or not. Examination methods can’t mainly use non-negative questions and multiple-choice questions, but should focus on the preparation of procedures and debugging procedures. By means of comprehensive assessment method, the usual practice scores and the final volume scores are integrated, and the comprehensive evaluation score of this course is obtained[4]. This method not only can reflect the students' learning situation more objectively, but also can promote the students' study and achieve good teaching results.

VI Conclusion

Result has proved that the core of computing thinking ability is problem solving ability, which is based on computational thinking. For the development of computational thinking ability, we have a consensus: first to find problems, and then to find a solution to this problem of different programs, and then to different solutions, and finally, program validation. In the course of teaching C programming language, no matter what teaching method should be adopted, it should revolve around this core.

References