

C Language Programming Course Reform and Practice of Teaching

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Abstract—C language programming is the first required course of computer basis after students enroll in university. This paper from the teaching objectives, teaching content, teaching methods, practice teaching, and so introduced the course reform. Practices have proved that these good results teaching reform will not only help to develop student's interest in learning and improve their comprehensive ability, but also help train students to analyze problems and problem-solving ability.

Keywords—C programming; teaching reform; teaching content; teaching method

I. INTRODUCTION

Both computer professional and non-computer professional, almost all of the schools have set up a high-level language programming. C programming language as the most popular programming languages in the world today, C language programming is a kind of programming courses is generally set up colleges and universities^[1]. The main task of the programming teaching is to train students the ability to analyze problems, design process, problem-solving ability and logical thinking ability. In "C language programming" course teaching, many teachers and students involved in the concept that the C language more complex, rules numerous, flexible, easy to make mistakes, teachers felt that teaching and student learning difficulties, and dare not program debugging^[2]. In particular, the majority of colleges and universities will be C language as a computer science student into the school after the first contact with the profession first basic course, this phenomenon is particularly evident. The author of the program design curriculum based on many years of teaching practice of the "C language programming" course from the teaching objectives, teaching content, teaching methods and other aspects of the bold reforms, and to achieve better teaching results.

II. PROBLEM OF C LANGUAGE PROGRAMMING TEACHING

Although the C language programming course in the creation of time for many years, but the C language in teaching still exist some problems. Based on past experience in teaching and communication with students and colleagues, we found that C language programming teaching still exist the following problems.

The traditional programming teaching method is unitary, students tired of traditional classroom teaching, the lack of communication between teachers and students^[2]. The traditional

teaching of C language programming, mainly to teachers in the teaching mainly in the teaching process and are mostly used in cases of pure mathematical abstraction, which for college students, both abstract and boring, making it difficult to understand and accept them no incentive nature, leading to classroom teaching quality, and student interest in learning is not strong, study results are poor, can not really understand the essence of programming.

Although there are relatively independent C language program design experiment teaching plan, but the experiment content is obsolete, the method of the single. Single teaching form, teachers' teaching, students according to the steps to complete. Insufficient experiment lesson, most of the major is 16 hours and such schedules far cannot satisfy the demand of cultivating the ability of students.

III. REFORM OF TEACHING

A. Reform Of Teaching Content

The teaching content of "C language programming" course mainly includes C language syntax based on program control structure, data types, pointers, functions, file its their applications. Teaching content organization, although the logical way of thinking was classified, but the difficulty is still more concentrated, concept speaks more to analyze less, not image, difficult to understand. Although the content in each chapter has already raised a number of programming examples, but most examples are difficult and irrelevant. The guiding ideology in the classroom teaching process, content of teaching will once again scattered and difficult to reach step by step. For example, C language data types, operators, expression, on the one teaching, learning together more difficult, so we deliberately arithmetic on the type of data types, operators, and related expressions give an introduction, so that students learning together is not so difficult to imagine. Then it was teaching students to write simple, practical C language programming, and then took the opportunity to introduce the basic input and output functions will come out ahead. For example, the pointer at the beginning of the concept of learning, teaching materials on the "indirect access" describes very well the hard, the students difficult to understand. We will borrow an analogy: A room key will be placed in room B, in order to get A room with items, we need to open the B room, remove the A key, then open the A room, remove the A room items, this is the "indirect access". Students will soon be able to

understand, but also deepened the concept of pointers. In the teaching process, the author is also timely access to English teaching materials and related newspapers and magazines, to difficult to understand a concept, give a different way to explain.

The C language programming is a highly practical course, it is necessary to grasp the concept, but also programming, machine operation^[4]. In the C language programming teaching, we need to pay special attention to the practice and application, including the programming experiment. In order to highlight the practice of teaching students the knowledge and application ability, the experiment the contents of reform, so as to design basic experiment, such as: calculate the distance between two points, simple sorting algorithm, search algorithm and other basic programming experiment. So that students can more smoothly through experiments, and timely to understand and digest the content of classroom instruction, students will obtain a certain sense of achievement, passion for learning will be further enhanced. On the other hand, we also design some experiments that have the certain difficulty and practical application. We organize students to discuss, through the discussions resulted in algorithmic process, and programming and debugging. For example: simple encryption and decryption of a string, and converted to uppercase of a strings. As a result, on the one hand help to help students develop knowledge and application ability and problem analysis capabilities, but the main thing is that they have also fostered collaboration. On the other hand, through the array and pointer with different problem-solving methods will enable students to deepen their understanding of what they have learned to allow students to truly appreciate the flexibility of C language programming.

B. Reform of Teaching Methods

The programming is a creative work, has the certain abstractness, it often uses mathematics to describe the method to solve the problem. The general procedures designed to establish a mathematical model to the algorithm design, so as to express the solution of practical problems as the computer can understand the form of expression. In teaching the process can not simply be satisfied with the number of students granted knowledge of the contents, but to strengthen the students to analyze and solve problems ability. Therefore, the classroom teaching to get rid of dull, rigid indoctrination should focus on to stimulate student interest in learning, help students establish the correct motivation, to develop student's ability to learn. Such as a mature project present the full C language code, the code in the algorithm to students, modeling the process, pupils develop good programming habits.

In the teaching process, the use of multimedia technology in teaching will help to stimulate student interest in learning and optimize the teaching process^[3]. But the multimedia aided teaching also has disadvantages. For example, affect student's attention and the emotional exchanges between teachers and students. In the teaching process of the C language programming, we consider the characteristics of this course, the organic combination of traditional teaching and multimedia teaching. For example, as the C language data types, variables, type, expression, three kinds of program structure, the concept of arrays and Pointers, they don't have the profound theory, so

we in the use of multimedia teaching. In addition, we also make full use of network resources, electronic lesson plans, outlines, courseware, exercise, etc. The concept of theoretical knowledge in the more difficult to understand and remember, it will so that some students lose interest in learning C language. To avoid this phenomenon, should be used "enough on the line", teachers in the teaching of specific procedures and cases when it is not related to the knowledge of supplementary explanation about, explain the method through which students can reduce the pressure to ensure the progress of teaching and teaching effectiveness.

In case design, we make full use of the advantages of traditional teaching, problem analysis and solution process will be written on the blackboard, analyzing problems at every level, one layer depth, the influence of the interaction between teachers and students, students will get give full play to the imagination. In the teaching process with "cases drive, interest, guide and self-realization" to complete the teaching process to students interested in a game for example, by using C language programming language to implement the course of the game caused the interest of students, and then explain the specific the C language knowledge, rise to the case of students interested in addition to the game case, but also can be interested in the contents of the other students. Finally let the students themselves to build a development project, with the knowledge learned C language to implement. This method avoids the tedious syntax of the training, students will not feel boring courses can improve student learning motivation, more importantly, students can feel the structure of C language programming ideas, and practical programming for a certain programming experience.

In the C language programming, exploratory teaching is a very good teaching method. It can give full play to the students thinking, highlighting the role of the students can effectively develop students analyze problems and problem-solving ability. The "select sort" as an example, we don't introduce the sort algorithms and program code, but should talk to the students on what is called the "select", and then let the students think about ideas of select sort algorithm, and then let the students to discuss and draw the flow chart, followed by explaining how to use for and if the program structure algorithm, and finally to explain the exchange in order to reduce the number of variables introduced to swap until the whole process to prepare the full. Combination of writing on the blackboard to explain the whole process step by step guide, get into the good teaching results.

C language programming are many definitions, concepts, grammar rules, it is difficult memories, is particularly prone to error. If we guide the students to summarize, it will play a very good effect. C language definitions, concepts, grammar rules are many similar places, such as: printf() and scanf() function, there are many grammatical rules are the same, if students remember one of them, another will be used. Array and pointer, because they are flexible, especially a pointer, many students think that they are very difficult. But if, after they are concluded, you will find both the two dimensional array or a pointer pointing to a pointer or other types of pointers, they will become with the one-dimensional array is as easy to use.

In the C language programming teaching process, bring into full play the autonomy and enthusiasm of students is a very important part. We according to the characteristics of the course and students' interest to arrange a lot of topics, for students to use spare time to think, gather information and organize the students in the classroom analysis and discussions. This teaching method can not only allow students access to many extracurricular knowledge, but also to promote the reform of teaching content, but also is conducive to fully tap the learning potential of students.

As the student learning ability, foundation, interests, degree of efforts, there is a big individual difference, so we decided the C Language Programming teaching must be individualized. For students with strong learning ability, we encourage them to self-learning, and to give direction to guide so that they can learn ahead. In the C language programming, to develop students self-learning ability is particularly important, if students rely on teachers to master, without a certain degree of self-learning ability, the knowledge they have learned quickly be eliminated.

For most students, they focus on learning good basic knowledge, to grasp programming method, which laid a foundation for the follow-up courses. In addition, the teaching process, we consider the problem from the perspective of students, to enhance teacher-student interaction effect. From the results we know that interactive teaching style can improve the students' programming ability greatly.

C. Reform of Practice Teaching

Students often don't understand the difference between algorithms and programming language, always trying to through the program design method, describes the algorithm directly edit compiling and debugging environment. So in theory the same time learning should guide students to the theory into practice, the perfect completion of the program algorithm to convert. Mechanical practice teacher assignments can only complete the understanding of knowledge; it can't complete understanding and application of knowledge^[4]. Use of project tasks to the students a way to pressure to students to improve their own brain in a short time the ability to use C language. Programming contest to give students a sense of honor, can stimulate students to learn initiative and creativity, students can fully display capacity. In the teaching process, according to the teaching content to finish the special application of competition can be completed in the C language to learn after the class.

Learning program design objective of the course is to master the design process of thinking, learn to use the computer language to write programs in order to achieve the required processing tasks^[3]. Therefore, emphasis should be placed on teaching the idea of solving problems, through a lot of practice to enable students to learn how to design an algorithm to construct a program. We started to enable students to write a simple program, and then gradually deepened. Subjects in the experiment set up on the basis of class arrangements, and to master the basic knowledge, set up to do with the election theme will do so in order to meet the needs of students at all levels. In order to improve students' comprehensive application

ability, we arranged a comprehensive large experiment after the course.

Teaching in the network can be made to the content of teaching the course website. We have developed shaoguan university online programming test website. The website includes the curriculum resources, information publishing, discussion boards, students self test and examination, the competition system of program design. Using this website, the teacher can complete information publishing, the homework assignments, students can submit assignments, discussion, each other between teachers and students, between students and students can communicate with each other, facilitate interaction between teachers and students. Our programming of the reform of experimental teaching method, improve the students' programming ability and the teaching quality.

Theory course explain the content on the site and related exercises. Students can access the site through the computer the contents of each class, the teacher, having problems in the preparation process can be adopted website to find relevant information to solve the problem yourself first. We also make full use of the network to provide students with a variety of information resources to support students in independent study and collaborative exploration. We opened a campus online learning forum on the C language, the teacher can communicate with students online forum, the study guide, answering questions, students can discuss with each other, exchange ideas and a variety of learning materials. This way to facilitate students to organize study notes, problem-solving skills, also available on the website layout and collection of student homework assignments, teachers work to facilitate marking.

D. Reform of Examination

C language programming test is measured in the course of teaching quality and students learning situation. Single assessment approach does not reflect student learning and teaching quality need to evaluate a variety of ways^[5].

C programming language examination test students to master the C language syntax, logical ability and programming ability. Not only subjective questions and objective questions to assess, but should focus on programming and debugging procedure. So the evaluation of the student grade, using comprehensive evaluation method, a final results obtained is test score in this course. This approach not only can more objectively reflect the student's learning, but also can promote student learning to play it good teaching results. Teaching is not the purpose of examination, but the learning ability of students with the practical hands-on ability, through the examination of the way so many ways to fully evaluate for study and practical hands-on learning ability.

To develop students' practical working competence, it is important to change the assessment approach and contents. It presents the reform to the single traditional examine mode by adopting the combine of many kinds of means and the curriculum design.

IV. CONCLUSION

In this paper, we introduce a series of teaching content, teaching methods, practice teaching and examination reform, it is based on the problems in actual teaching process, and has been in the "C language programming" course in the use of teaching practice, and obtain a good teaching results. Of course, the same teaching content are confronted with different students in the use and need design teaching methods, also requires the students with the moves taken that teaching methods and learning methods should be an organic unity. We will continue to explore, making the course teaching effect is better.

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