Thinking on the C Language Teaching Method for the Major of Agricultural Mechanization Engineering

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Abstract. As the entry-level subject in computer science, the C language programming is a very important course that have been opened in various majors in the university. But the short period for the theoretical and practical study and the abstraction of the C language make it a very difficult course for the students who are major in Agricultural Mechanization Engineering. According to the interaction with the students who are major in Agricultural Mechanization Engineering in Inner Mongolia University for the Nationalities, some teaching methods suitable for the students were obtained, and the teaching practice was carried out in class. The main teaching method is progressive catechesis to inspire the students gradually. By solving the problem of side to mobilize the students' interest on learning the C language. Once the students' enthusiasm and the sense of achievement were motivated, the teaching effect could be improved greatly.

Keywords: Agricultural machinery major · C language teaching · Teaching practice teaching

1 Introduction

The C language has many advantages, such as the rich functions, good expression ability, flexible and convenient application, wide application range, high efficiency, good portability and so on. It has both the advantages of high-level language and many characteristics of low-level language [1]. Since the C language has so many advantages, the C language program design has been set as a basic compulsory course in the College of Mechanician Engineering in Inner Mongolia University for the Nationalities. Take the major of Agricultural Mechanization Engineering as an example, the period for theoretical study is 30 h and for practical study is 16 h. As the entry-level subject in program design, the C language course is opened in every major in the College of Mechanician Engineering. By studying this course, the students could learn how the computer works and lay the foundation for learning the other kinds of programming languages. The mechanical and electric are not independent from each other. For the mechanical majors, some control courses are included and the students need to learn how to control the devices through programming. So it is very important for

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students to learn C language well. But for the beginners, the C language is too abstract with a lot of knowledge to be understood and recited. Those objective causes weaken the students' learning enthusiasm greatly. Meanwhile, the short period for the students in Agricultural Mechanization Engineering major makes it impossible for the teachers to explain the knowledge points in details. Therefore, by mastering the students' learning psychology and improving the teaching skills to mobilize the learning enthusiasm are the keys to improve the teaching effect [2].

2 To Clear the Importance of the C Language and Mobilize the Enthusiasm of the Students

At For the Agricultural Mechanization Engineering major, after finishing the C language program design course, there are another two programming courses in the follow-up classes. But for the students, the one year interval may result in the forgetting of the C language. For the students who are major in Agricultural Mechanization Engineering, they do not know the real purpose of the C language course. They think that programming is useless for them. Under this psychological effect, as well as the abstraction and a lot of knowledge point need to recite, most of the students abandon the study of this course directly. All the causes mentioned above make the C language course has a higher rate of failing during the final exam. To change this bad situation in the C language course, the first thing is to make the students understand the importance of learning the C language. And the enthusiasm of learning the C language can be mobilized by understanding the usefulness of this course.

In order to make the students realize the importance of the C language, the topic of employment which mostly concerned by the students was used. The total number of newly graduated students was over 7 millions and the problem of employment has always been a hot topic every year. In the process of employment, the certificates have always been the important stepping-stones to a good job. In addition to the Certificates IV and VI in English, the Computer Certificate II also has a higher gold content. Once the crisis sense of the students was awaken by the problem of employment, the enthusiasm of learning the C language could be aroused, too. Through the combination of the C language course and the national computer grade examination, the students' attention on the C language was attracted greatly.

3 The Existing Problems

There were some problems still after the students' attention was attracted by the C language course. To achieve a good teaching effect, all the existing problems should be solved. The outstanding problems in the teaching process are as follows.

3.1 The Teaching Method of Repeating What the Book Says Leads to the Students' Lower Learning Enthusiasm

Previously, the popular teaching method for C language course was to repeat what the book says with the help of the multimedia slides. The evaluation criteria of teachers' teaching were mainly by the smooth explanation and no error but without taking the teaching effect into account. Therefore, the teachers were skillful and spoke fluently on the C language class. But actually, the students learned a little about the C language knowledge point and there were still a big gap between the theoretical knowledge and the practical application. If the situation continues in this way, the students soon lost their interests about the course. Both sides of the teaching would find it difficult to put forward the teaching process without a good foundation and the overall learning efficiency would be further affected.

3.2 The Low Combining Degree Between Theory and Practice Leads to the Unsatisfaction of the Computer Practice

In the traditional teaching process, most of the computer practices were about the conversion problems from the mathematical formula to the computer program based on the single knowledge point. The aim of this kind of problem was to reinforce the single knowledge instead of combining the previous knowledge point. And they were helpless for the students to solve the comprehensive problems. Meanwhile, the questions aimed at the programming grammar were boring and weakened the students' learning enthusiasm greatly.

3.3 The Lacking of the Effective Interaction Between the Students and Teachers Makes It Difficult to Master the Students' Actual Learning Situation

In the previous teaching process, the communication between teachers and students was limited in class and homework. However, due to the restrictions such as the study period, the teaching content and the student number, the communication during the class was in small-range and superficial, which could not truly reflect the overall learning situation. In addition, it took a certain amount of time for the teachers to correct the homework. So the communication through the homework was useless for the teachers to master the real-time learning situation. All the factors mentioned above made it difficult for the teachers to make targeted adjustments about their teaching method.

In the traditional teaching mode, the theory divorced from the practice in a certain degree which affected the teaching results. The teachers should find the suitable solutions according to the practical problems to improve the teaching effects.

4 The Teaching Method of Progressive Catechesis to Inspire the Students Gradually

4.1 Classroom Teaching

Teaching according to the textbook says could only transfer the knowledge to the students but could not lead the students to understand and master them. Therefore, an effective teaching method which combined the heuristic and examples should be proposed to attract and motivate the students to learn. The following contents could be contained in the classroom teaching.

For some programs, if the rules could be summarized easily, the students should be inspired to do by themselves. Before explaining the examples, let the students to summarize the rules after observing the computational results of the program. This could effectively deep the students' understanding of the knowledge point and further stimulate the students' learning interest. For example, when explaining the 'if-else' function, the following program could be run firstly.

```
#include <stdio.h>
int main()
{
char c;
printf("Input a character:");
c=getchar();
if(c<32)
printf("This is a control character\n");
else if(c>='0'&&c<='9')
printf("This is a digit\n");
else if(c>='A'&&c<='Z')
printf("This is a capital letter\n");
else if(c>='a'&&c<='z')
printf("This is a small letter\n");
else
printf("This is an other character\n");
return 0;
}
```

When running the program, to enter a different value for the variable x and observe the output value of the variable y. By the single-step debugging method, the students could summarize the functional characteristics of the "if-else" function. Through this way, the knowledge point could be explained vividly.

There was no feeling of difficulty for the students by using of the progressive catechesis teaching method to inspire the students gradually. For example, when explaining the loop structure, the question was to output an asterisk pattern of five lines and five columns. For the students who just learned the "printf" function, their first response was to use the "printf" function five times and the question cold be settled easily. But if the question was slighted modified and the output was changed into

outputting an asterisk pattern of ten lines and five columns, their answer would to use the "printf" function ten times. If the question was modified into outputting the asterisk pattern of two hundred lines and five columns, should the "printf" function be used for two hundred times to settle the question? Was there a more concise answer? At this moment, the concept of loop structure was proposed and the question could be settled by a program in three lines. Through a thinking process like this, the students' impression of the loop structure would be more profound.

The flexible using of textbook examples in class could also be very effective. By making small transformations on the basis of examples, gradually deepening the difficulty, the curiosity of the students could be mobilized and drive the students to think and to deep the understanding of the knowledge points. The question about selecting the bigger number in two numbers was a classic example in the C language. It was very easy and could be settled by comparing one time. But if the question was modified as to select the biggest number in three numbers, the students could answer the question by comparing two times. The teaching result by explaining a knowledge point after the students' own thinking was much better than explain it directly.

In addition, in the teaching practice, it was found that the students' attention could be attracted easily when the teacher made mistakes during the demonstration process. According to this phenomenon, the mistakes could be added intentionally to improve the students' attention and enthusiasm. By the explaining of the mistakes, the students' recognition of the common mistakes was deepen.

The TurboC2.0 in Chinese version was used as the experimental software. Since the error notification was in Chinese, the students could change the grammar mistake according to the notification. But the TurboC2.0 was based on the DOS operating system, it was very inconvenient without the mouse and copy/paste operation. To begin with, most of the mistakes were concentrated on the input and the grammar. After the students were familiar with the software and the structure of the program, the software was changed into Visual C++ 6.0. Meanwhile, the excursion would focus on the logical capability instead of the input and the grammar by improving the difficulty of the examples.

4.2 Humanistic Care

During the improvement of the teaching method, most teachers were more concentrated on the visible things like the contents of the courses, the teaching methods rather than the emotion. But actually, the teaching process could be influenced by the emotion enormously since the students were not the machine. Once the students started to get bored when they saw the teacher, even if a teacher has high level of teaching skills, it couldn't be applied to improve teaching quality. So, it was important to deal the relationship well to create a good atmosphere to guarantee the smooth development of the teaching process. There were many ways to promote the relations between students and teachers, such as the encouragement after a correct answer or the help in the times of difficulty as well as by remembering the students' names. The teachers should treat the students as their friends and solve the problems from the students' standpoint to let the students feel the teachers' mind.

4.3 Improving the Quality of Teachers

The "student oriented" teaching method put forward higher requirements for teachers. On the one hand, the time and resources were needed to guarantee the teacher could stand at the students' standpoint to stimulate the students' interest in learning and improve their learning efficiency. On the other hand, the teachers need to teach in accordance with the clearly defined syllabus and plans to ensure the smooth implementation of the teaching process. The exploration still needed to balance the two aspects above to achieve the optimal result. For the new students in the new semester, their ability and the way of thinking were quite different from the previous students. So the teaching method should be changed according to the matter of fact to achieve the teaching goals. And it was a high requirement for the teachers' personal ability. It was said that "If you want to give a bowl of water to a student, a teacher needs a bucket of water first". It was not only that the teachers should have enough knowledge about the knowledge of the courses they were teaching, but also have relevant knowledge of the professional field of the students. Only in this way could the actual application be brought into the classroom, which makes the teaching come from practice and serves practice.

5 Conclusion

The time for theoretical and practical study in C language course is little for the students who are major in Agricultural Mechanization Engineering. But they could also learn it well with the help of the flexible teaching method to mobilize their study enthusiasm and to lay a foundation for them to pass the computer grade test. With the fast development of the society, the teaching method should also keep pace with the time by inspecting and learning from the other teachers to improve the teaching skills to drive the students' learning enthusiasm.

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