The Application of Hybrid Learning Method in the Teaching of Assembly Language

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Abstract. The hybrid learning method is based on classroom teaching and MOOC platform, which helps students to learn independently, and improve the initiative of learning. In the actual teaching, a variety of teaching methods are used, such as case teaching, comparative explanation, abstract metaphor, intended to improve the interest of learning, to strengthen the learning effect.

Introduction

The assembler language is a language that closing to the machine programming languages, which makes students feeling that the knowledge are too difficult to understand, and things needed to understand are too much. As for your own programming, more feeling does not know how to start. If the teacher according to the traditional teaching method in classroom instruction, the interpretation of blindly to explain in detail the function of the program, students learn not only the mastery of the knowledge, it will produce school-weary emotions to this course. How to improve the learning efficiency, provide the study enthusiasm, become the focus of the current curriculum construction.

Based on years of teaching experience, combined with the characteristic of students, we adhere to the principle that the interpretation of the teacher is the most important method, and the MOOC online learning is complementary. The teacher explains and analyzes the important and difficult points in the classroom, and at the same time makes MOOC video. Thus students can choose online learning in their spare time to consolidate the classroom content, expand the classroom knowledge. Once they encounter some questions, they can discuss among students, also can ask questions online, teachers or classmates online answer.

The Hybrid Method of Teaching in the Teaching of Assembly Language Application

Assembly language teaching goal, is not only learning a programming language, but also more importantly, learning the programming skills. Because the assembly language is a programming language that closes to the underlying hardware computer, so, through learning assembly language, students can grasp the working principle of the computer's internal hardware and then understand the programming skills, so as to create efficient light program. With the basis of assembly language, for other high-level programming language learning can have one instance, the lines. So in the process of the whole assembly language teaching, the
teacher can not only explain how to use the instructions and how to program, but also further analyze the instruction execution steps, which can make students understand the principle of operation mechanism and programming of the computer.

According to the characteristics and teaching focus on the content of the assembly language, a hybrid method of teaching has the following several kinds:

**Case Teaching Method**

In the knowledge of assembly language, the grammar is boring to understand, and the register is implied in the instructions, the design idea is not clear, and the logical structure is changeful. So, in the class, teacher tries to find some examples of everyday life, by analyzing the implementation steps, the elaboration implementation details, share programming skills and instruction to the students.

For example, when teaching the instructions of moving the characters from the source buffer to the destination buffer, I guide the students to imagine that a string is these desks and chairs, which will be moved from room 101 to room 102. In order to complete the moving, firstly, we must determine its location of the room 101 (in the program, it is the segment address of the source string), and then the position of the tables and chairs (in the program, it is the offset address of the source string). Secondly, we determine the location and the position of the room 102 which is the destination of the chairs (in the program, they are the destination segment address and offset address). Thirdly, we determine the direction of the moving, such as moving from left to right, or vice versa. In the program, this corresponds to the direction of moving from low to high address (CLD), or from high to low address (STD). Fourthly, we must know the numbers of the seats to be moved, which corresponds to the length of the string. The four problems have been solved, we can began to move the chairs, using the instruction MOVSB. Because there are many characters to be moved, so add REP repeat instructions. That is the complete operation process of the REP MOVSB instructions.

Through the physical operation, the students can understand the instruction execution. The method not only can improve the students’ interest in learning, more important it analyzes the meaning of instruction by the vivid image of parsing.

**Contrast Teaching**

Combining with the teaching practice, the students before learning assembly language had learned C++ language, so often the library function in the C++ function to introduce to the students, and then use the assembly language to achieve the library function. The students feel that the comparison is better than the individual directly on assembly language programming. This comparison method is simple and easy to understand, and by this way the students have a deep understanding of the operation principle, their understanding of the advanced language program more in-depth, the mutual promotion of learning effect is unexpected.

For example, in the explanation to the output of the assembly language, the integer into characters can be output to the display. In a high-level language C++, using cout() function call can output any format of the data, such as %d, %c, %f, etc. In assembly language, output an integer needs 30 instructions to be realized. Assembly language program needs to convert each numbers into the corresponding integer characters, then the individual characters in the output in turn. Actually, in a high-level language also need this conversion process, such as %d format control converts the integer data to the corresponding characters, then displays on the screen. But in high-level language the specific implementation details are defined as the
system function. We only need to call the system function. Through the contrast, students understand the principle of the computer output data, which improve their learning interest.

**Abstract Metaphor**

Many principles of assembly language are abstract because it explains the internal hardware knowledge, such as the address of storage location problem, which is invisible to the storage unit. If we simply tell the students that the computer storage unit address is divided into segments and offset, students are not easy to understand. However, we image the serial number of the classroom to segment address, the capacity of each classroom is similar to the storage unit partition size; Seat number is similar to offset, at various time in the same classroom for different students in class, students is similar to the data in a storage unit. After understanding the segment address and offset, it’s time to explain why address should be divided. If the school seats aren’t divided into a classroom, we give a lesson on Monday in 1060 to 1660 seat number. Such a direct physical address is not convenient to find and difficult to remember. But if the address is expressed as a classroom number (address) and relative to the position of the door of the classroom number (offset), it’s easy and convenient to find the classroom. So, In order to facilitate the programming, the designer uses logical addresses to represent the actual physical address of the storage unit.

**The Production and Use of MOOC Video**

The video records the contents of the teacher’s explanation, including the analysis of program ideas, procedures for the preparation of the program, what the teacher writes on the blackboard, detailed instruction decomposition, and so on. We can record the others after class. Such as program running and debugging content are recorded through the screen recording tool, the teacher’s explanation can be recorded in office, where is quit. Finally we can Synthetic video into one file.

While the student is using the MOOC video files to study, he can review the knowledge without understanding several times, he can ask online, he can communicate with his classmates. Those classmates with a common interest may become good friends, and they can help each other, and work together to improve themselves.

**The Effect of Teaching Reform**

The practice of teaching reform has been affirmed by the students. They said: "I really appreciate the joy of learning autonomously, the real effect also let me deeply understand the teacher is coaching, rather than the passages". The concrete results show that the teaching quality has been improved, and a number of outstanding and creative students have been discovered. Some in the lower grade are recommended to participate in research activities in the research group, showing its ability to innovate.

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References


