

Exploration on Teaching Reform of JAVA Language Programming Course

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Abstract: Many college students in learning Java language, would face a lot of difficulties. So they often could not reach the predetermined learning goals, and gradually lost interest in learning programming. Therefore, this paper analyzed the crux of JAVA language learning, put forward the corresponding teaching reform measures and carried out a semester of teaching reform experiment. At last, the author received good teaching results.

Keyword: JAVA language; Programming; Curriculum Teaching Reform

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I. Introduction

JAVA language is a basic course for many majors, such as computer science, educational technology and so on, and it is often the first choice for the introduction of object-oriented programming language in these majors. However, most college students lacked the basic knowledge of programming and computer principles in high school, so they encountered many difficulties in learning JAVA programming. As a result, their academic performance was not ideal, and some students had completely lost confidence in learning programming languages, often recited program statements to cope with the assessment. If the course of JAVA language programming was not well learned, it would be more difficult to learn other courses based on JAVA language in the future. Therefore, as a programming teacher, based on my years of practical teaching experience. This paper summarized the problem of JAVA language learning of college students, and put forward its own new teaching ideas and teaching mode.

II. The crux of JAVA language learning for college students

1. Lack of basic knowledge of programming in high school

In high school, many students lacked the environment and enthusiasm for programming language learning. So they were short of internal driving force for programming learning. At the university stage, these knowledge shortcomings soon appeared, which were manifested in the slow acceptance of basic knowledge of computer principles and poor understanding. They could not understand the cooperative working principle of CPU, memory and other computer components, and had no clear understanding of the basic concepts and logic of programming language, so it was not efficient and effective to learn programming knowledge under such circumstances.

2. Programming language is abstract and difficult to understand.

As a computer programming language, JAVA language has the common characteristics of abstract and difficult to understand of most programming languages, which is difficult for many students to learn, and it is difficult to form abstract logical thinking ability.

3. Programming knowledge system is complex

Programming language involves various and complex knowledge, such as identifier, variable type, syntax, integrated development environment, program error debugging, relevant data structure knowledge and so on. However, the amount of class hours was relatively small, and students could not complete the learning and mastery of knowledge in the limited class hours, resulting in more and more ignorance of knowledge and decreasing enthusiasm for learning.

4. Students couldn't solve problems at any time when they encounter them

When learning programming languages, we often encountered some small problems, such as the small BUGs when writing programs. Although the problems were very small, but it was difficult to find, and sometimes it would take a lot of time to solve it. At this time, if we lacked the guidance of teachers, it would bring a lot of confusion to students, form a roadblock on the way to learning, and easily lead to students' frustration in learning. It would also greatly reduce students' interest in learning.

5. Students were lazy to practice

Learning programming needs to write a lot of code to consolidate the learning effect. The author often told students that if they wanted to really learn the programming language, they need to write 10000 lines of code

steadfastly. However, in the actual teaching, it was found that most students are lazy to write code, and the phenomenon of copying and pasting code often occurred, and it was not easy for teachers to find. Students would form a lazy learning atmosphere.

6. Learning effectiveness were not high

Unlike learning graphic design courses, learning programming is difficult to make decent works, and sometimes after a whole semester, some students could hardly write a decent small program to show off.

7. Object-oriented conceptual thinking is difficult to understand and master

To learn JAVA programming language, we should not only learn the syntax and programming logic of JAVA, but also learn the object-oriented conceptual thinking. In programming, how to abandon the process-oriented problem-solving thinking and form the object-oriented problem-solving thinking is another important learning goal to be achieved in JAVA language learning. But it was difficult for most students to understand and master object-oriented thinking, and they paid more attention to solving problems than training object-oriented thinking when writing programs.

8. Students were unable to solve practical problems with programming language

Programming language learning is ultimately to solve practical problems. But many students once leaved the program in the textbook, they are confused and do not know how to start writing, let alone writing programs to solve practical problems encountered. The uselessness of program was also a major reason for students' low enthusiasm for learning. This also showed that many teachers do not pay attention to the introduction of practical problems in teaching, and can not combine the theoretical knowledge of textbooks with practical problems to mobilize the enthusiasm of students.

III. Teaching reform objectives of JAVA language programming course

The author tried to achieve the following goals through a semester of teaching reform and exploration of JAVA language programming course:①To have a strong interest in learning programming languages;②To master the basic concepts and syntax of JAVA language;③To master the thinking concept of object-oriented programming;④To master common object-oriented programming design patterns;⑤To form good self-study ability and learning habits;⑥To deepen the understanding of relevant knowledge such as data structure, network communication, etc.⑦To successfully write a practical program.

These learning goals had been greatly improved compared with the past, which required both teachers and students to make relatively greater efforts to achieve, so it was a huge challenge for both teachers and students.

IV. Teaching reform measures of JAVA language programming course

In order to successfully achieve the reform goal of JAVA language programming course, based on the author's years of experience in programming language teaching, according to the current learning characteristics and learning status of college students, the following reform measures are adopted:

1. Introducing the successful cases of outstanding students in the past to stimulate students' interest in learning

In many years of teaching, every year there would be several students who were excellent in programming learning. Many of these students had achieved high-paying employment, and some had become management personnel in the company. Their successful experience could effectively drive the current college students and form their learning motivation. Therefore, in the first lesson, the author carefully selected several outstanding representatives. Through video meeting between them and classroom students, they introduced their current work content, previous learning experience and successful experience, which greatly stimulated students' learning enthusiasm.

2. Making up for the short board of knowledge and laying a good foundation for learning

Because students usually lacked the knowledge of the working principle of computers and the basic knowledge of programming, they must learn the basic knowledge again in the first few classes of the course, and I told them that they could really learn the knowledge well step by step. The time lost in explaining these knowledge would be gradually made up in the subsequent practice classes. So as not to affect the overall learning progress and content.

3. Visualizing the abstract knowledge to reduce the difficulty of learning

There are a lot of abstract and difficult knowledge in JAVA language programming, which makes it difficult for students to learn. For example, the cross-platform feature of JAVA language was not easy for many students to understand. Therefore, the author used the form of a small sitcom to let a classmate play a tourist who was traveling around the world, as well as several local translators, who were responsible for translating the words of tourist into the local language, so as to communicate with local service personnel. So that students could understand that the cross-platform of JAVA language was undoubtedly to localize the bytecode (similar to

tourists) formed by JAVA source program through the virtual running environment (similar to translators) of different platforms, and to interact with local resources (similar to service personnel) so as to obtain the desired function. In this way, students could easily understand the platform independence of JAVA language. For another example, the integer in the memory is in the form of complement, which is not easy for most students to understand. Therefore, the author used animation to explain in the teaching process, and has achieved good results.

4. Trying to condense all the language knowledge into one program and realize the change of version

In the previous teaching process, a knowledge point was often explained by a small program, and many students could not integrate these small programs into their own large programs in the end, and could not realize their predetermined program functions, resulting in students' frustration. So in this teaching reform, the author tried to design a complete program to explain almost all the knowledge points of JAVA language. It also allowed students to see how to iterate from the first version of a program to a higher version, laying the foundation for their own step-by-step writing of a complex program. After much deliberation, the author decided to write a QQ-like network chat tool. From this example, students could learn the object-oriented programming thinking, the principle of encapsulation, the knowledge of network communication, the preparation of GUI and various concepts that were not easy to understand, such as abstract class, interface, polymorphism, inheritance and so on, almost all the knowledge, key and difficult points of JAVA language object-oriented programming. Each version could better establish their confidence in learning too.

5. Setting up a study group which students could get answers at any time

As mentioned earlier, students may encounter problems that they can't solve in the process of learning and programming. So the author had set up a learning group, in which there were some former excellent students, especially those who had become senior programmers. When students ask questions in this group, they could get answers at any time. It could also help students understand the current working situation of the IT industry and help them find jobs smoothly in the future.

6. Writing code every day and clocking in

In order to enable students to write code every day and correct their bad habit of being lazy in doing things, a small program has been developed to enable students to write code, which could not let students copy and paste, but could only type the code, and the ranking function had been added, so that the number and total amount of code written by students every day could be easily seen and ranked, so as to urge each student to continue learning.

7. Reforming the way of teaching evaluation and cancelling the form of examination paper

In order to enable students to really learn how to program and write more code at usual, the author changed the previous way of writing test papers, and completed the final exam by writing a complete program with practical functions. The author would provide students with a guide to select programs. In writing this relatively large program, students consolidated the knowledge and concepts they had learned. Moreover, with the gradual realization of the program function, they had improved their confidence and interest in learning.

8. Setting up interest groups for follow-up learning

Many students were worried that a semester's study could not guarantee all-round learning needs, and how to carry out follow-up learning. Therefore, the author set up a JAVA language interest group, who was interested in in-depth study could join the group, continue their JAVA journey. Teachers provide knowledge and technical support around the clock.

9. From point to area improving students' computer technology level in an all-round way

Through the course of JAVA language programming, more students could experience that as long as they worked hard and wrote more programs, even if their foundation was poor, they could learn computer-related knowledge and technology well, which increased their confidence in learning. Therefore, this could stimulate their enthusiasm to learn other computer courses and lay a good foundation for the study of the whole major.

V. Summary

The teaching reform of JAVA language programming course for a whole semester had come to a successful end. In this process, both the author and the students have made great efforts and achieved great success. In the future, the author will continue to carry out the reform of the course of JAVA language programming, strive to achieve greater results, so that students can learn and apply what they have learned, so as to enhance their learning motivation.

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