Research on the Teaching Mode of Java Series Course Based on CDIO Engineering Education Concept

SHUYING ZHANG and YUE GAO

ABSTRACT

This paper analyzes the current teaching situation of the Java series. The concept of education based on CDIO engineering was studied. In combination with the goal of cultivating application-oriented talents, the education concept of CDIO engineering is applied to the teaching mode of Java series. To determine the course group for the Java series, and the teaching mode of the Java series curriculum based on education concept of CDIO engineering is described in detail. And determined the corresponding relationship between the teaching objectives of the Java series curriculum and the training objectives of CDIO. It is necessary for students to adapt to the needs of the market and get a good practical effect.

KEYWORDS
Java Series Course, Education Concept, CDIO Engineering, Teaching Mode.

INTRODUCTION

With the development of national informatization development strategy and the rapid development of software industry. The demand for talent in the software industry has exploded. The new and higher requirements for college software engineering talent cultivation are put forward. And since the Java language was born. Because of its security, cross-platform, object oriented, simple and applicable to network and other notable features, it has rapidly gained the recognition of the majority of users and become the most popular online programming language. For years, the market for Java programmers has remained the top [1]. To meet the industries huge demand for Java talent, at present, most universities in China offer Java series courses and treat it as an important course. Java technology is far from the programming language category, become a complete system which covers programming mode, framework and object-oriented design thought, method and language aspects of the connotation [2]. The content of this system is complex, so this series is not simply a simple verification of theoretical knowledge, instead, students should be able to cultivate students' practical ability from the learning process and reach the seamless link with the employer.
In order to improve the teaching effect of the Java series, we need to adopt an advanced education concept to guide the teaching reform of the Java series. In recent years, many experienced teachers have proposed various teaching reform programs [3-4]. It mainly includes project-driven teaching reform, case based teaching reform and teaching reform based on CDIO concept etc. The teaching method based on project and case can help improve students' Java programming ability. But as a qualified software technician, the programming ability is only the technical foundation. Qualified software developers should also have the ability of teamwork, communication, innovation, system engineering and professionalism [5]. Using the education concept of CDIO engineering to reform the Java series curriculum, there is no corresponding relationship between the teaching objective of Java series and CDIO competence training and the lack of effective test verification [6]. Therefore, we study the teaching mode of Java series based on education concept of CDIO engineering, to determine the corresponding relationship between the teaching objectives of Java series and the ability of CDIO, to make students adapt to the needs of the market. This is a subject worthy of study, which is of great significance.

In the second section of this paper, author introduces Java Series Classes. In the 3rd section, author introduces Teaching Mode of Java Curriculum Group. The last section is conclusion.

JAVA SERIES COURSES GROUP

Curriculum groups are a series of courses based on a single course, which are independent and closely related to each other. Java curriculum group is based on Java programming, commonly with JSP programming, J2EE advanced programming, Java Web project development and application of Java framework and J2ME mobile development technology and the J2ME mobile phone game programming as peripheral forming course group. As shown in Fig. 1. The course group weakens the concept of curriculum individuation, and strengthens the integration, intersection and association between curriculum content. Through these courses, students have grown from being ignorant of Java technology to becoming qualified Java software development engineers. The Java curriculum group is completely from a global perspective, according to the concept of engineering education, to eliminate repetition and useless knowledge, to maximize the integration of teaching resources and optimize the teaching structure. In the course of teaching, the teacher emphasizes the scale benefit and group advantage of the class group, gradually enables learners to master the basic principles and latest technologies of Java technology.
TEACHING MODE OF JAVA SERIES COURSES GROUP

In combination with the goal of cultivating application-oriented talents, the concept of education engineering is particularly important in the construction of Java curriculum group. Therefore, according to the idea of education in engineering, it is very important to explore the teaching mode of Java course group.

The CDIO represents conception, Design, implementation and operation. It is the carrier of the life cycle of product development and product operation to enable students to study engineering in a proactive, practical, and organic way. The CDIO training program divides the abilities of engineering graduates into four aspects of engineering basic knowledge, personal ability, interpersonal team ability and engineering system ability. The syllabus requires students to achieve their goals at all four levels in a comprehensive manner. The teaching mode of Java course series based on education concept of CDIO engineering is mainly embodied in the following aspects:

1) From simple to tedious and progressive teaching methods, cultivate students' engineering basic ability

The Java course group consists of several separate and tightly connected courses. Each course has a different course goal, but these courses are interrelated and form the Java curriculum. These courses cooperate with each other to build a knowledge system and capability system for students with relatively complete Java technology. When teachers teach, start with the basics of Java and gradually expand to peripheral courses. From the small practice project, gradually to the big comprehensive project, the students gradually mastered the Java knowledge system.

2) Adopt the modular teaching mode of engineering to cultivate students' personal ability

Adopt the idea of modularity to teach, highlight, divide the project into a sub module, let the student practice and practice more, cultivate student's individual design and development ability. By learning different Java technology knowledge modules, designing and implementing different project modules, students master the latest Java technology to become qualified Java engineers. The implementation of modular...
teaching enables students to gradually adapt to the learning of the course group. It also provides a good foundation for the future work of students.

3) Strengthen the cooperation of school enterprises, attach importance to the project training, and cultivate students' team cooperation ability.

Project training is an important stage in the teaching of Java series. It has changed the traditional teaching thought that emphasized theory and ignored practice for a long time. Schools and enterprises have cooperated with enterprises and introduced some engineers from well-known enterprises. Students can feel the atmosphere and culture of the company without having to go out of school. The teaching programs of some university-enterprise cooperative classes are mainly composed of teachers and business experts with the ability of "double division". The school invited outside experts to enter the school to undertake the training task. At the same time, students are arranged to conduct production and research and development, enterprise training and other training in enterprises and research and development units. Currently, the state promotes innovation and entrepreneurship among college students. Teachers actively absorb students' participation in their own subjects and create a good learning atmosphere for students. At the same time, give priority to with school teacher, and hire outside experts in the field of computer engineering, a line of corporate developers, forming a complex, diversity, combining study, combined with face-to-face teaching staff, and set up a series of lectures on Java technology. In this way, students are instructed to innovate and create jobs, and provide a certain environment to improve students' ability to cooperate and adapt to the enterprise environment.

4) Encourage students to take part in competition in various disciplines and cultivate students' comprehensive design ability.

A competition often involves multiple courses, and the Java curriculum is composed of several courses. This provides a good basis for the discipline competition aimed at cultivating the ability. For example, "Java programming contest" "college student innovation entrepreneurship competition" "mobile game development competition" and other forms of Java discipline competition. These competitions will enable students to increase their interest in learning the Java course and use it. The discipline competition mode can cultivate students' teamwork spirit and comprehensive design ability. In the form of competition, the disciplines competition includes individual and team competitions. If you are to compete in the form of a group competition, a few contestants work together to solve a problem. This requires the players to work together in a fixed time, and the team spirit will have a great influence on the results of the competition. It is also important for students to work and study later. Therefore, in practice, to establish a learning interest group, and the final assessment will not only assess the tasks of the members, but also the operation of the project. This enables team members to cooperate with each other, communicate with each other, brainstorm, solve problems together, and raise students' team spirit and cooperation ability.

5) The evaluation system of emphasize practical ability.

Because the Java series has a very practical nature, therefore, the traditional emphasis on theory assessment has become increasingly unsuitable for the assessment of Java series courses. In the assessment, we should greatly improve the ratio of practice ability to the assessment result, and reduce the ratio of theoretical knowledge assessment. Therefore, we should establish an assessment and evaluation system that attaches importance to practical ability, as shown in table 1.
TABLE 1. THE ASSESSMENT METHODS OF JAVA SERIES COURSES.

<table>
<thead>
<tr>
<th>No.</th>
<th>The assessment content</th>
<th>Assessment way</th>
<th>Weight/%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>At ordinary times the inspection</td>
<td>Attendance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Job performance</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Answer the question</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The experimental results</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Comprehensive practice</td>
<td>Think of innovation</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Design rationality</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Implementation integrity</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operational stability</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Assessment of theory</td>
<td>The written test</td>
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</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
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CONCLUSION

This paper applies the education concept of CDIO engineering to the teaching process of Java series and discusses the teaching mode of Java series based on education concept of CDIO engineering. This enables students to adapt to the needs of the market, and to achieve seamless connection with employers. In the course of teaching, although some achievements have been made in the course of teaching, there are still some problems to be studied. In the later teaching practice, we will continue to improve, better satisfy the market demand.

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