



J. Management & Education
Human Development

ISSN: ISSN: 2775 - 7765
web link: <http://www.ijmehd.com>



Java Course Teaching Reform And Research Based On CDIO Teaching Mode

Dong Yuxia

Quanzhou Institute of information engineering, Quanzhou 352000

Received: 20/08/2021

Accepted: 26/12/2021

Published: 09/04/2022

Representative e-Mail: -

ABSTRACT

Under the guidance of CDIO Engineering Education Mode, aiming at the problems existing in java course teaching in our school, this paper carried out the teaching reform with project-based teaching as the main line. The core of the reform is to cultivate students' engineering practice ability, and the reform research is carried out from the selection of course content, teaching mode, assessment and evaluation, etc. The reform achievements have played a positive role in improving students' comprehensive ability and quality, and have cultivated application-oriented talents in line with the actual market demand.

Keywords: CDIO, Active Learning, Practical Teaching, Teaching Reform

INTRODUCTION

In recent years, Quanzhou Institute of information engineering has been emphasizing the application of knowledge, cultivating students' active and practical teaching methods, and cultivating applied talents in line with the actual market demand. Driven by this concept, we began to explore the CDIO education model suitable for the development of students in Quanzhou Institute of information engineering. In order to cooperate with the teaching reform of the college, the java series courses of the software college also began to build a teaching resource system with the CDIO concept as the guiding ideology. The previous studies of some scholars and the author show that CDIO education mode is effective in cultivating students' programming ability, stimulating students' learning enthusiasm, and improving students' practical ability and ability to solve practical problems. [1]

1.1 introduction to CDIO teaching mode

CDIO Engineering Education model is the latest achievement of international engineering education reform in recent years. CDIO Engineering education concept was researched and founded by famous universities such as Massachusetts Institute of technology and Royal Swedish Institute of technology. CDIO represents conception, design, implementation and operation. It takes the life cycle from product R & D to product operation as the carrier to enable students to learn engineering in an active, practical and organic way. CDIO training outline divides the abilities of engineering graduates into four levels: engineering foundation, personal ability, interpersonal team ability and engineering system ability. It is required to enable students to achieve the predetermined goals at these four levels in a comprehensive way. [2]

1.2 current situation of java course teaching

Java language is an object-oriented programming language, which has the characteristics of high security and platform independence. It is one of the most widely used languages in software enterprises. According to the survey results, Java ranks first in the market share of various languages in the software industry, with a specific share of 17.56%. The survey results of the talent market also show that at present, the demand for Java software development talents is in short supply, and its talent market demand has reached 70%. There is a huge gap in Java talents. Although many universities, especially private undergraduate universities, have set up software engineering majors and Java curriculum system to cultivate Java talents, many universities are teaching, the more traditional teaching mode is still adopted. The trained students only understand the basic knowledge of Java, and few students can contact real Java projects in the teaching process, which leads to the lack of engineering practice ability and low professional quality among students. Aiming at the problems existing in the java course teaching process described above, this study adopts the CDIO Engineering Education Concept to carry out project-based teaching, and introduces corresponding project cases for different teaching situations in the teaching process, so that students can effectively use the java knowledge

system learned to solve practical engineering problems in the teaching implementation process, So that students can effectively master the ability to solve complex engineering problems.

II. RESEARCH METHOD

2.1 problems in Java Teaching

(1) The course content is mainly theoretical and the practice link is weak. In the training plan of the credit system, the credits of Java programming course are basically 3-4 credits, and the class hours are controlled within 64 class hours. In the actual teaching process, the proportion of classroom theoretical teaching is often higher than that of practical teaching. Due to the wide range of knowledge points of Java programming, if you still teach in the way of learning language basis and take theoretical knowledge as the focus of course learning, it will inevitably lead to the advanced knowledge in the later stage of the course staying in the teaching of knowledge, and because there are few practical classes, you can't go deep into the learning of its practical application level.

(2) The teaching objectives are not clear enough. At present, many teachers still carry out classroom teaching according to the content of teaching materials, lack of selection of knowledge content, and the teaching focus is designed according to chapters. Java course teaching is often implemented in several different majors with the same teaching design, resulting in the inability to focus the teaching objectives and insufficient support for the training objectives in the talent training scheme. This also makes learners' learning objectives not clear enough and lack of active learning.

(3) The teaching method is single and lack of innovation. [3] In the theoretical teaching link, most teachers basically focus on Teachers' teaching, lack of links for students to actively think about problems, and the design of interactive links is divorced from reality. They usually ask questions about knowledge points, which cannot achieve the training of practical engineering ability. In the practical teaching link, although the students actively complete the practical tasks assigned by the teachers, the training guidance is not strong. They usually set questions around the knowledge points, which is far from the actual engineering project. They can only achieve the simple application of the knowledge points, lack the arrangement and design of the project, and the effect of practical teaching is poor.

(4) The way of curriculum evaluation is single. In the final assessment stage of java course, many teachers mostly use the traditional assessment method of paper test paper, focusing on the degree of students' mastery of theoretical knowledge, ignoring the assessment of practical ability, which will affect students' enthusiasm to try skill application to a great extent. For students with strong practical ability, they cannot reflect their real level, but also curb the exertion of their specialties.

2.2 reform ideas

According to the above problems, based on the in-depth understanding of the CDIO Engineering Education Concept, focusing on the above problems, combined with the characteristics of the knowledge architecture of Java language programming course, the author carries out project case teaching in two different teaching stages of basic knowledge and applied knowledge respectively, according to the conception, design, implementation Carry out project-based teaching in four stages of operation. [4] In the process of teaching implementation, we should focus on students and emphasize the dominant position of students in the teaching process. Give full play to students' autonomy in project-based teaching. In the overall design of curriculum teaching, the main implementation process of software project shall correspond to the four stages of CDIO. Each teaching case shall go through the four engineering practice processes of C, D, I and o. In the project conception stage, students should analyze the functional requirements of the project; In the design stage, students should carry out outline design and detailed design of the project; In the implementation stage, students should write and test the project code and write project documents according to the requirements; In the operation stage, students should complete the project demonstration and report, and teachers should preside over the project review to form the assessment of java knowledge in this stage.

Through the implementation of the project-based teaching reform of CDIO mode, taking the project as the carrier, integrating the CDIO Engineering Education Concept, highlighting the cultivation of students' practical ability, making them have the practical application ability of Java programming engineering, and familiar with the basic ideas of software design and software development.

2.3. Reform of project-based teaching content

CDIO Engineering education concept advocates "learning by doing", that is, let students learn engineering in an active and practical way. Under the guidance of this concept, the author deconstructs and reconstructs the Java curriculum knowledge system, and formulates the knowledge objectives, ability objectives and quality objectives of Java curriculum, so as to solve the problem of unclear teaching objectives. Integrate teaching objectives into teaching projects, take teaching projects as the main line of curriculum teaching, and implement classroom teaching. The course teaching implementation process is no longer pure theoretical teaching, but runs the project through the knowledge system, so that students can learn knowledge and exercise their independent thinking ability and practical ability in completing the project, so as to achieve the purpose of "learning by doing".

Teaching project is the carrier of teaching process. If the project is too complex, it will lead to the situation that most students can't grasp; The project is too simple to achieve the effect of training. Therefore, the selection of teaching projects is very important.

After comparing, selecting and screening several projects, it is finally decided to choose "student information management system" as the case of comprehensive teaching project. The difficulty of the project is moderate, which is

suitable for students to analyze the needs of the project, convenient for students to add various functional modules, and has strong interest. The teaching project consists of six key functions such as "user interface design, menu function realization, login verification, user authority setting, data (addition, deletion, modification and query) operation, file storage and copy". At the same time, students can design other functions according to their own needs, such as "Dormitory intelligent distribution function, class management function, community management function, course score management function and timer function" to enrich the teaching project and form a complete project. In addition, in the teaching implementation link, we can start from "Tetris, snake, jigsaw puzzle and interesting chat room" And other small projects to increase the interest of teaching, and increase the algorithm design to attract students' learning interest and enthusiasm, so as to achieve the purpose of daily teaching and training.

III. RESULT AND DISCUSSION

4.1 reform of teaching mode and examination and evaluation method

4.1.1 teaching mode reform

In order to cultivate students' engineering practice ability, CDIO Engineering education concept requires that the classroom teaching mode should no longer be the traditional "full house" teaching mode, but should reflect the student-centered and project-based teaching mode in the teaching process. Based on this, the teaching implementation process of this course is to reform and explore the teaching mode under the guidance of CDIO syllabus, and gradually summarize a set of effective teaching methods.

4.1.2 project driven teaching method

Teachers take project cases as an example of course learning, and introduce the course learning objectives, that is, the programming technology and theoretical principles to be learned, so as to attract and stimulate students' interest in learning; Then, systematically explain these technologies and principles; Finally, the realization process of teaching case is restored through the taught technology and principle. The whole teaching implementation process is equivalent to a "slow motion" playback process of teaching project with explanation, so that students can effectively master new knowledge from the level of technical application. After the completion of knowledge teaching, according to the feedback of students on knowledge mastery in the classroom, the teacher is using one or two similar cases for students to discuss in the classroom and hand over the classroom to students. The teacher immediately changed his role and became a counselor of the project, answering questions and answering students' questions in time, so as to obtain the best teaching effect and effectively cultivate students' independent thinking ability, problem-solving ability and technology application ability. In the process of carrying out project teaching, teachers should pay attention to grasp the difficulty of the project and control the teaching progress. In the early stage, the project should focus on simple interest and the progress should be slightly slow, so as to cultivate students' interest in learning. Finally, according to the mastery of most students' knowledge, gradually increase the difficulty of the project and leave more classroom time for students, so that students can gradually start thinking independently Problem-solving mode lays a good foundation for later learning advanced knowledge such as network programming, multithreading and GUI design.

4.1.3 group practice teaching method

In the later stage of Java programming course, the knowledge is basically application-oriented, and the project cases are large. In order to better carry out the practical teaching link, the group method is adopted in the implementation stage of project case teaching in the later stage of java course learning. Team cooperation mode is the main working mode of software development. Using group mode for project-based teaching is an effective means to cultivate students' team cooperation ability, which is suitable for training students' team cooperation consciousness. The specific method is to divide the students into several groups with 3-4 people in each group, and one student is elected by the group members as the team leader. The team leader is responsible for the task division of the team members, and organizes the team members to carry out learning and discussion, write code, write documents (experimental reports), etc. During the group study, the teacher is responsible for reviewing the work plan of each group, reviewing the progress of the project and organizing the project defense. During the implementation of group practice teaching method, teachers found that there was a large gap in students' practical ability. Some students with strong practical ability stood out during the project development. Very few students could not only complete the project development well, but also have the ability to cooperate with teachers to guide other groups. Therefore, group practice teaching can not only effectively cultivate students' project practical skills and team cooperation skills, but also explore talents.

4.2 reform of assessment and evaluation mode

With the reform of teaching mode, the traditional examination method cannot make a real level evaluation of students' engineering practice ability, but should establish a multi-dimensional evaluation mechanism. Under the CDIO teaching mode with project teaching as the main line, we should highlight the evaluation of students' practical skill level, so as to accurately reflect students' real level. In this regard, the author implements curriculum assessment and evaluation from five links: volume assessment, ordinary assessment, experimental assessment, engineering ability assessment and team cooperation assessment. The specific forms and weights of each link are shown in Table 1 below.

Table 1 Assessment and Evaluation

Evaluation Mode	Content Of Examination	Assessment Time	Evaluation Method	Weight Proportion
Volume assessment	Basic theory, basic grammar, basic programming capabilities	Final unified examination	Teacher evaluation	30%
assessment at ordinary times	Participation, interaction, discussion, and work	Daily assessment	Teacher evaluation	10%
Experimental assessment	Completion of the experimental projects in each teaching link Submission of the experimental report	Daily assessment	Teacher evaluation	20%
Engineering capacity assessment	1. Completion of the comprehensive project 2. Document writing and project defense	One week before the final exam	Teacher evaluation	30%
Team ability assessment	Task completion of the members within the group	One week before the final exam	Group members evaluate each other	10%

The paper examination mainly examines the mastery of students' basic knowledge and theoretical knowledge; The usual assessment emphasizes students' participation in the discussion and interaction of daily teaching; The weight of experimental assessment, engineering ability assessment and team cooperation assessment accounts for 60% of the comprehensive score, highlighting the investigation of the completion of projects in each stage of the teaching link, and reflecting the assessment and evaluation mechanism of CDIO Engineering Education Concept with the project as the main line.

IV. CONCLUSION

Java programming is a professional core course of software engineering in our university. Students' mastery of the course knowledge system will affect their subsequent learning of Java EE courses, java web courses, wechat applets, Android mobile applications and the development of graduation design. The author integrates the CDIO Engineering Education Mode into the Java curriculum reform, carries out project-based teaching under the guidance of the CDIO Engineering Education Concept, effectively improves the teaching quality, plays a positive role in cultivating students' engineering practice ability, achieves good teaching results, and provides experience for the follow-up java system curriculum reform. In the process of reform, the author also realizes that the cultivation of engineering practice ability is a systematic project, which needs the active participation of students, but also the cooperation, support and attention of schools and social enterprises. Only in this way can the teaching reform continuously promote the improvement of teaching quality and truly cultivate engineering talents in line with the front line of enterprises.

REFERENCES

- Guo Shurong. Research and practice of blended teaching mode based on "Internet plus classroom". [J]. Heilongjiang education, 2017 (3): 39-41.
- Jiang Dazhi. Active project driven learning under CDIO Engineering Education Mode -- Taking "Java programming" course as an example [J]. Journal of Shantou University, 2012 (4)
- Li Zhongwu, Chen Liqing. Discussion on the teaching reform of assembly language programming based on CDIO concept [J]. Netizen world, 2014 (1): 108
- Xu Ying, Zhang Shunde. Exploration on Java programming curriculum reform based on CDIO training mode [J]. Hua Zhang, 2012