Construction and Application of Project Driven "One Body, Two Wings and Three Stages" Teaching Mode based on OBE Concept

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ABSTRACT

In view of software engineering students' lack of engineering practice ability, the "one body, two wings and three stages" teaching mode running through the project is applied to the teaching process. Through the construction of double project driven and double tutor guidance, students' engineering practice ability has been cultivated, and certain results have been achieved, which provides a reference for the construction of project driven Teaching in related majors.

KEYWORDS

OBE, Project Driven, Dual Mentors, Practical Ability.

1. INTRODUCTION

China officially joined the Washington Agreement on international engineering education in 2016, marking that China's engineering education quality certification system has achieved international substantial equivalence, and the quality standards of engineering majors have reached international recognition [1]. The basic concepts of the agreement mainly include student-centered, student learning results oriented education and continuous quality improvement. Among them, outcome based education (OBE) education is an educational concept oriented by students' learning outcomes. China's engineering education certification standard (revised in November 2017) follows the outcomes based education (OBE) model, that is, goal oriented education or ability oriented education, emphasizing the development of training goals according to school positioning and social needs. In the engineering education certification standard, it is proposed that the graduation requirements formulated by the major should fully cover the engineering knowledge, problem analysis, design / development solutions, research / use of modern tools, etc. of "solving complex engineering problems" [2].

"Java Web Programming", as a technical basic course of software platform development, is a professional course offered by computer related majors in many Application-oriented Undergraduate Colleges and universities. Based on the Java language, this course focuses on servlet, JSP, JDBC, El, JSTL and other technologies, so that students can master the basic theory and core technology of web program development; Through solving practical problems, improve students' ability to analyse and solve problems in the process of program design; Through the use of integrated development tools to write and debug programs, students' practical ability is

improved, so that students' theoretical knowledge and practical ability can be developed together [3].

The traditional teaching mainly focuses on transferring knowledge. The curriculum pays attention to the amount of students' knowledge reserves, and does not pay attention to the cultivation of students' ability to apply knowledge, students cannot comprehensively apply knowledge to complete the development of simple web projects. As a supplement to theoretical teaching, experiment is a link in the process of theoretical teaching. In general, the teacher guides the students to write the code. The result of this method is that students simply follow the teacher to write the code mechanically, without their own ideas and methods, and their ability to solve problems independently has not been trained. As a practical course, in the teaching process, we need to strengthen the strength of practical training, and we need to change the teaching methods. Project-driven teaching method is a teaching method to achieve teaching goals. It takes the teaching content as the main line and the realization of projects as the task to improve students' interest and enhance students' practical ability.

2. DEVELOPMENT STATUS

In the process of engineering education certification, colleges and universities have also carried out corresponding reforms to the course. Literature [6] [7] [8] adopts the method of project teaching to fully mobilize students' enthusiasm and cultivate students' comprehensive ability to develop enterprise level projects. Literature [9] has improved the teaching methods and focused on cultivating students' practical ability, which has also achieved good results. It can be seen that many colleges and universities in China have reformed the course of "Java Web program design", but these reforms basically have only one project and only or the guidance of school teachers.

In order to further improve the professional construction level and improve the quality of talent training, the software engineering specialty of our university started the engineering education certification in 2018. In order to improve the teaching effect, the teachers of the course group introduced the project driven teaching method into the course of "Java Web Programming" and proposed the project driven teaching mode of "one body, two wings and three stages".

3. CONSTRUCTION OF PROJECT DRIVEN "ONE BODY, TWO WINGS AND THREE STAGES" TEACHING MODE

3.1. Project Driven Teaching Principles

Project driven teaching method is a teaching method that takes students as the center, projects as the carrier, and allows students to complete projects under the guidance of teachers. The main goal is to enable students to learn in practice, achieve the goal of mastering knowledge and skills and cultivating practical ability. [11] Project driven teaching takes the familiar and relatively simple project as the teaching carrier, guides students to analyze the project, then decomposes the project into several relatively independent functional modules, and leads to the theoretical knowledge and skills that need to be mastered to realize the function of the project. Each class iteration completes the functional modules and finally realizes all the functions of the whole project, so as to stimulate students' interest in learning, improve their practical ability and achieve the teaching objectives.

3.2. Project Driven "one body, two wings, three stages" Teaching Mode

The concept of OBE emphasizes the orientation of students' output. Therefore, it is necessary to formulate the curriculum objectives first, and then divide the teaching contents into three levels: classroom teaching, experimental teaching and project development according to the curriculum teaching objectives. As shown in Fig. 1, the teaching mode of "one body, two wings and three stages" is constructed based on curriculum knowledge and project driven. Integration refers to taking students as the main body; "Two wings" refers to the guidance of school teachers and enterprise teachers; The three stages refer to the classroom teaching stage, the experimental teaching stage and the expansion project stage.
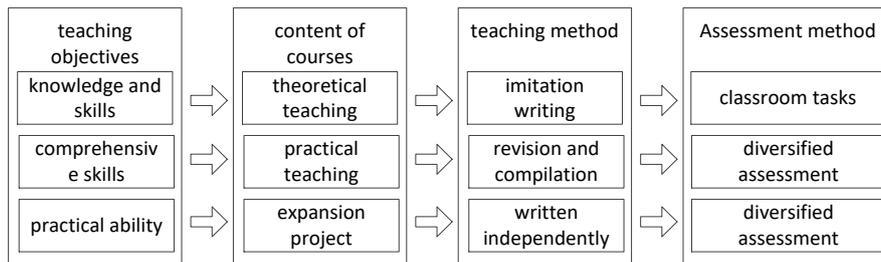
Figure 1. Curriculum teaching system

In project driven teaching, teachers transfer knowledge by completing projects and solving problems in projects, and transfer the methods, means and ideas of applying knowledge to solve problems, so that students can clarify what to do in the process of solving problems, that is, to clarify learning objectives and tasks; And master how to do it, that is, the knowledge and scheme design used to solve the problem; Understand why to do this, that is, the principle, and think about how to do it better, so that students can explore better and more perfect solutions. There are two kinds of projects in project driven teaching, one is teaching project, which is the project that teachers explain and lead students to complete during class, and the other is expansion project, which is completed by students independently. Project driven teaching method takes subtasks as the carrier and combines teaching units. The overall teaching process is shown in Figure 2.
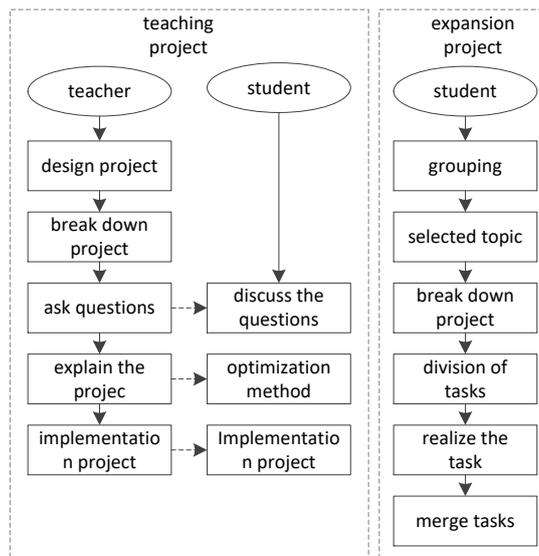
Figure 2. Project driven teaching process

4. IMPLEMENTATION OF PROJECT DRIVEN "ONE BODY, TWO WINGS AND THREE STAGES" TEACHING MODE

"Java Web program design" is a comprehensive and practical course. It involves basic knowledge and also integrates the knowledge of Web front-end technology, object-oriented programming, database application and other courses. Therefore, in order to effectively integrate knowledge and exercise practical ability, the course adopts the teaching method of "project driven and combination of teaching and practice".

4.1. The Teaching Method Of "project driven and combination of teaching and practice"

Under the project driven mode, two kinds of projects are designed, namely, teaching project and expansion project. The teaching project takes a basic user information management system as an example and runs through the whole teaching process. The project is divided into three modules, namely user login module, user information display module and user information modification module. The information modification module is divided into four sub tasks, which are: adding user information, modifying user information, deleting user information and searching user information. Among them, user login runs through the whole theoretical teaching process, and the other five tasks are the tasks of experimental teaching.

In this mode, the course content is integrated and divided into four modules, including one environment configuration and eight technologies. Each technology corresponds to a user login task. The user information display module and the user information modification module are completed in the experimental teaching link. At the end of the course, students also completed the study and practice of the whole project. The specific project tasks and course contents are shown in Figure 3.
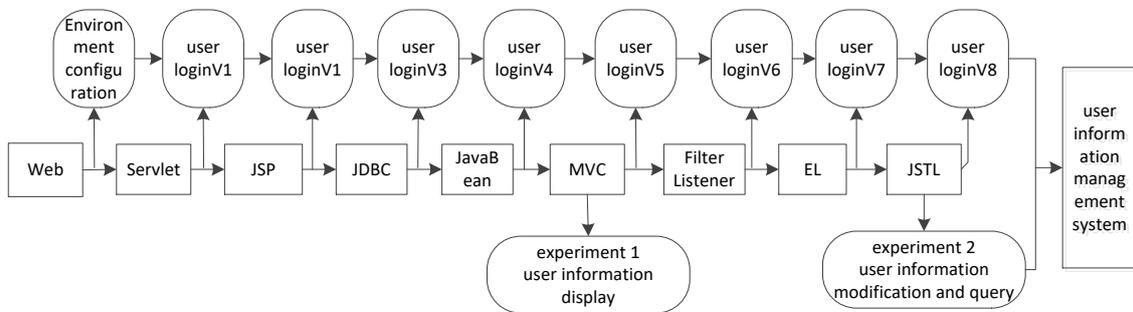

Figure 3. Project tasks and course contents

Due to the differences in knowledge and experience of students, they will have different understanding in the process of receiving new knowledge. Teachers should teach students according to their aptitude. This course adopts hierarchical teaching for students at different levels of knowledge and ability. When realizing the function of the teaching project, students can use the relevant technology of the course according to their own conditions. When the project function is realized, it will stimulate the enthusiasm of students. When implementing expansion projects, different tasks are assigned according to the differences of students' abilities. Students with strong abilities can complete multiple and difficult functions; Students with weak ability can complete simple tasks, or even functions in similar teaching projects, and master the most basic skills through repeated practice.

School teachers and enterprise teachers teach together. Based on project driven, students play an active role in teaching activities, and teachers and enterprise lecturers provide guidance together. Students can freely form teams to carry out the conception, design and implementation of project development. Teachers guide and support the whole project development project. In the process of project development, students can imperceptibly cultivate their self-learning ability, actively analyse and solve problems.

4.2. Teaching Effectiveness

The "one body, two wings and three stages" teaching mode run through the project has been applied in software classes 18-1,2. As can be seen from Figure 4, compared with the traditional software classes 18-3, 4, the proportion of high scores has been significantly increased, and the proportion of low scores has significantly decreased. Through the follow-up survey of the pilot class, the feedback results show that the new teaching mode has exercised the students' practical ability, communication ability and comprehensive application ability of knowledge.
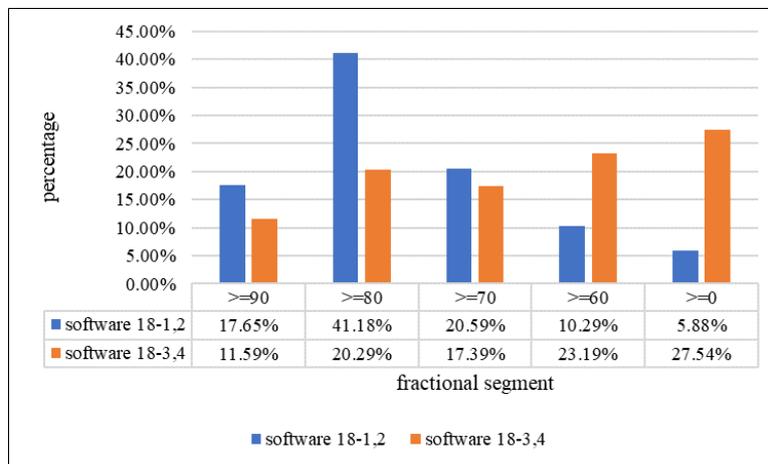

	>=90	>=80	>=70	>=60	>=0
software 18-1,2	17.65%	41.18%	20.59%	10.29%	5.88%
software 18-3,4	11.59%	20.29%	17.39%	23.19%	27.54%

Figure 4. Comparison of teaching effects

5. CONCLUSIONS

This research topic takes the course construction of "Java Web Programming" as the research object, mainly for undergraduate students majoring in software engineering in the school of data science and application. Later, the course team will summarize experience and combine the feedback results to form a more perfect teaching method, which will be promoted to other professional courses.

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