

Research and Practice on Project based Teaching of Java Web Application Development Course based on Shipping Characteristics

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Abstract

To overcoming the separation problem between the major teaching and industrial development, the software technology specialty takes the systematization of the working process as the basic idea, carries out the project-based teaching reform, and realizes the transformation from the knowledge system to the ability system. In order to better reflect the shipping characteristics, the software technology specialty takes the shipping information project as a project-based teaching case. As a core course, the Java Web application development course takes the enterprise workbench module of ship water pollution supervision and service information system as a teaching case throughout the course. In the teaching process, the cultivation of knowledge, skills and accomplishments is carried out throughout the process of student project realization, so as to truly achieve learning by doing and learning by doing. The project teaching of Java Web application development course with shipping characteristics has improved the teaching quality of teachers and students' enthusiasm, and provided a new method and perspective for the teaching reform of software technology courses in higher vocational colleges.

Keywords

Shipping Characteristics; Project-Based Teaching Reform; Javaweb Application Development; Ship Water Pollution System; Software Technology.

1. Introduction

With the development of vocational education, there is a trend of diversification of student groups. The differences of students' learning interest, learning ability and learning needs are increasingly prominent [1]. Software technology leads the era from tradition to intelligence, which is an important starting point for industrial transformation and upgrading. The integration of software technology and traditional industries requires a large number of high-quality software technicians with professional skills and craftsmanship [2]. At present, in terms of software training for talents in higher vocational colleges, there are generally problems such as the disconnection between the training target system and industrial demand, the personalized training of engineering practical ability and professional quality, and the adaptability of personalized training and traditional teaching methods [3-4]. To solve the above problems, the software technology specialty aims to meet the new needs of social development and enterprise innovation for software technology skilled talents and high-quality workers, and to meet the needs of industry and its enterprise talents, reconstruct the curriculum system,

update the teaching content, reform the teaching methods, and explore the comprehensive reform of project-based talent training for software technology professionals.

The core of project-based teaching reform is to select appropriate project cases and decompose them according to work tasks. Real project-based teaching cases are more helpful for students to understand the industry and master the real development status of enterprises [5-6]. As a software technology major in maritime colleges, it needs to highlight the shipping related characteristics. The software technology specialty chose to cooperate with the maritime information enterprise, and introduced the ship water pollution supervision and service information system of Yangtze River trunk developed by the enterprise into the teaching. It has become a case of specialized project-based teaching by school enterprise cooperation. Through the project-based teaching reform with obvious shipping characteristics, the quality of software technology talent training has been significantly improved, the characteristics of software talent training have been fully highlighted, and students' awareness of actively serving the development of the shipping industry has been significantly enhanced.

2. Project based Teaching Cases

2.1. Ship Water Pollution Supervision and Service Information System

In order to reflect the maritime characteristics and implement the task of establishing morality and cultivating talents, the software technology specialty has selected project-based teaching cases that integrate value guidance with industry characteristics. The project-based teaching takes the Yangtze River Ship Water Pollution Supervision and Service Information System (abbreviation the Water Pollution System) as the carrier, and applies the technology applied in the project to the curriculum system of the entire software technology speciality, cloud computing technology speciality, big data technology speciality and other majors through technology decomposition and technology iteration. As shown in Figure 1, the architecture provides online applying and handling service system for related ships, port operation units and pollutant receiving, transferring and processing units on the Yangtze River trunk.

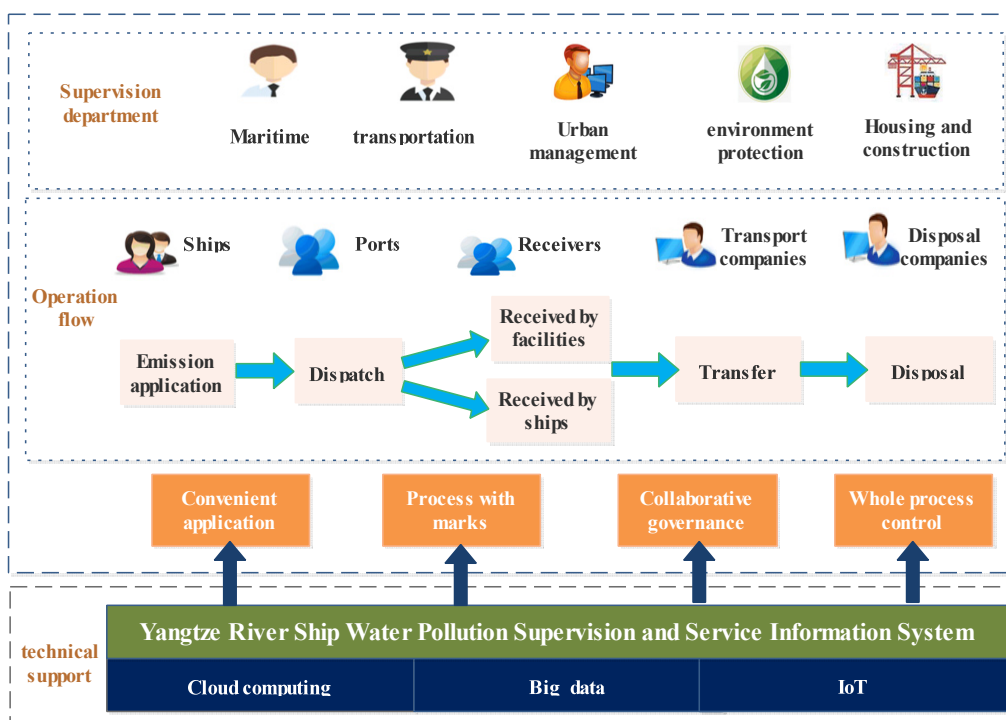


Figure 1. Ship water pollution system architecture

The Java technology used in the system development can be used as a project case throughout the software technology speciality. The system is deployed on the private cloud platform, and the private cloud building process and system deployment can run through the cloud computing technology. The system needs to be connected with intelligent devices, involving Internet of Things technology, which can be used as a project case of Internet of Things technology. The system needs to provide support for management decisions of the maritime sector. The system includes a big data analysis and display module, which can be extracted separately as a project case that runs through the big data technology and application discipline.

2.2. The Course System of Software Technology Specialty is based on Project-based Teaching

The water pollution system software is developed using mainstream front-end and back-end separation technology. The back-end uses Spring Cloud+MyBatis+Redis, the front-end uses Vue+Bootstrap+jQuery+LayerUI, the mobile terminal uses mixed development+WeChat applet mode, and the database uses MySQL. This technical route is the mainstream development route adopted by medium-sized and above software enterprises at present [7]. As shown in Figure 2, the software technology speciality aims to train students to complete the project, and runs through the training of knowledge, skills and accomplishments in the process of student project realization, so as to truly learn by doing and do by learning.

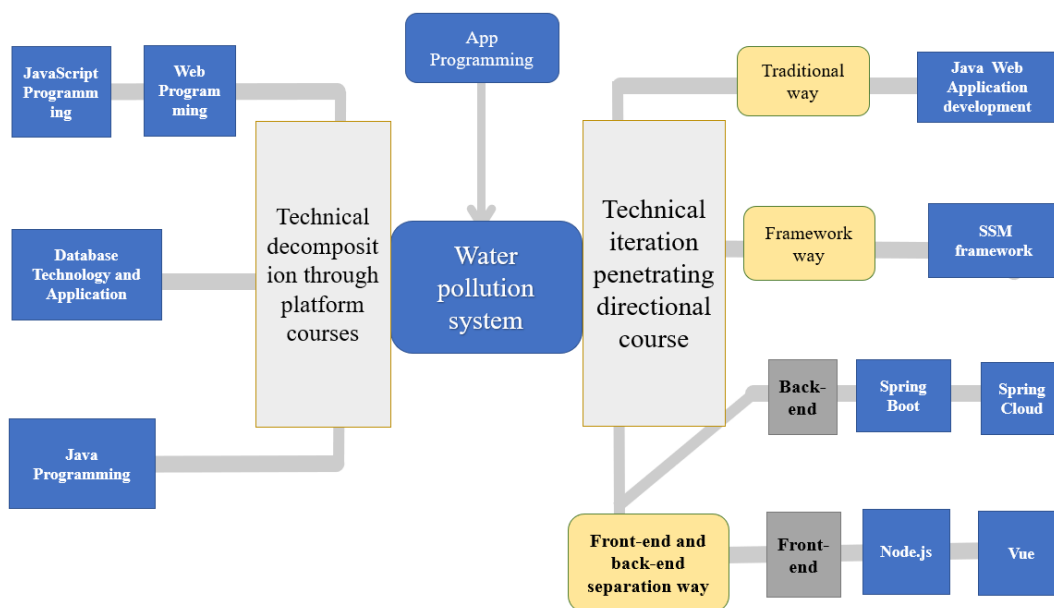


Figure 2. The course system of software technology specialty is based on project-based teaching

The single skill technology involved in water pollution system involves program design, database application technology and web page programming technology. These basic technologies will run through the professional group platform courses. The water pollution system is developed iteratively according to small project development technology (traditional Java Web development method) → small and medium-sized project development technology (framework development method) → medium and above scale development technology (microservice development method), so that students can gradually master the system development method through iteration.

3. Project based Teaching Implementation of Java Web Application Development Course

The Java Web application development course takes the enterprise workbench of the water pollution system as the case throughout the course. The workbench includes 11 modules, which are divided into four stages. The stage of progressive learning is in the form of breakthrough which consist of the following stage → The filling the blank stage → The independent programming stage → The design+programming stage (extracurricular expansion). The remaining four modules are designed by students themselves as extracurricular expansion and implemented independently. If students can complete independently and pass the teacher's defense, they can be exempted from the examination. When students complete tasks, teachers only provide basic knowledge and solutions for project completion. Specific tools, methods and techniques require students to learn independently through online platforms, and teachers play a role in guiding, prompting and answering.

3.1. Pre Class Learning

In pre class learning, teachers need to formulate unit goals, prepare guidance plans, extract project knowledge points, and interact with students online. Teachers shall set teaching objectives for each lesson according to the requirements of the syllabus.

3.2. Classroom Teaching

Classroom teaching is divided into two parts, explanation and discussion, and task completion. In the first half, teachers sort out knowledge points, explain key and difficult points, help students consolidate knowledge, and realize the construction and internalization of knowledge according to the statistics of MOOC platform learning and testing. The second part is to complete the task of water pollution project. The teaching activity takes the project driven as the main form, the working process as the main line, and the completion of the project task as the goal to reasonably integrate the Java Web application development theory and practice. In this part, teachers are mainly responsible for assigning tasks, answering questions, summarizing and evaluating. In teaching, the group is the main body of the project implementation, and the identity of the teacher is changed into a technical consultant. The division of groups is determined according to teaching requirements, students' professional abilities and the principle of balance. In the process of teaching organization, the competition mechanism is introduced to make the project a stage for students to compete with each other in skills and professionalism, and to clarify students' learning objectives. The realization of each task will bring students a sense of achievement experience, promote students' enthusiasm for learning, and change from passive learning to active learning.

3.3. Consolidation after Class

In the consolidation after class, teachers help students consolidate and deepen their knowledge, strengthen their skills, and test the school effect. Teachers will assign homework and release unit tests according to students' mastery of knowledge points, and students will further consolidate their knowledge and skills through online and offline resources. At this stage, teachers need to start with knowledge and skills, arrange theoretical and practical assignments on the SPOC platform according to the unit teaching objectives, and design unit tests. According to the completion of homework and unit test results, students with good performance should be assigned extended tasks; Further guidance will be given to students with poor completion.

3.4. Teaching Assessment

The whole assessment is divided into process assessment and comprehensive assessment. The process assessment includes three parts: usual performance, usual assessment and project assessment. The proportion of each module is shown in Table 1.

Table 1. Assessment and Evaluation Form

Assessment Name		Assessment content	Proportion
Process evaluation	Usual performance (online+offline)	Classroom attendance, Q&A, online resources and discussion are evaluated	15%
	Regular assessment (online+offline)	Quality of work and test completion	15%
	Practical project 1	Design and Implementation of Registration Module	10%
	Practical project 2	Design and implementation of water pollution discharge statistics module	10%
	Practical project 3	Design and implementation of map display module	10%
Comprehensive evaluation	Project design	Implmented by submitting project report and defense	20%
	Comprehensive assessment	Final examination	20%
General evaluation		Process evaluation (60%)+comprehensive project design evaluation (40%)	100%

Adopting a variety of assessment mechanisms to objectively, fairly and comprehensively evaluate students' learning conditions will help students improve their enthusiasm for learning, promote their academic performance, and increase their confidence and determination in software development.

4. Conclusion

The reform of project-based teaching is an important starting point for higher vocational colleges to improve the quality of running schools and personnel training, and an important starting point for promoting high-level professional construction. As a software technology major in maritime colleges and universities, it makes full use of maritime information projects and other characteristic educational resources, takes the ship water pollution system as a case of project-based teaching, reconstructs the curriculum system, curriculum and teaching content reform, and significantly improves the quality of talent training and social service ability.

With the rapid development of software technology and the constant change of students, the project-based teaching reform of software technology courses in higher vocational colleges is always on the way. Teachers need to constantly improve and reflect on project-based teaching activities, fully tap the ideological and political elements of the curriculum, so that the teaching content can better meet the requirements of the post, so that the teaching activities can be more acceptable to students.

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