

Exploration and Practice of Scientific Research Feedback Teaching in Front-end Development Courses

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Abstract: Web front-end development, as the basic technology of new technology application products such as artificial intelligence and the Internet of Things, is widely used in government affairs, e-commerce, education, finance and daily life, and is one of the necessary skills for information technology talents. In order to connect with new industrial technologies and better cultivate software technology talents, this research carries out the reform of feedback teaching based on the real projects of enterprises, mainly from the four aspects of teaching content, teaching mode, evaluation means and curriculum ideological and political education, respectively designing project type hierarchical teaching content, classroom teaching based on software development process, multiple evaluation integrating enterprise norms and standards, and ideological and political education mode with scientific research projects as the carrier. Finally, it is applied to the teaching of the core course of software technology, "Web Front End Development", and has achieved good results.

Keywords: Feedback teaching, Front end development, Models of Teaching, Evaluation reform.

1. Introduction

In recent years, digital economy, as an important engine for transformation and upgrading of traditional industries and promoting high-quality development, has become one of the important national development strategies[1]. The digital development of national and regional industries needs the support of a large number of new generation software technicians, and it is particularly urgent to cultivate high-quality and high-quality professionals. As the basic technology of various Internet application products, artificial intelligence and other new technology application products, Web front-end technology has been widely used in government affairs, e-commerce, education, finance, daily life and other fields. It is one of the necessary professional skills for software technology professionals. The teaching of Web development related courses is very important for talent training. With the development of new computer technology, the application scenario of Web front-end development technology is becoming wider and wider, and the technological change is also changing with each passing day. The course content also needs to be constantly connected with the enterprise technology and industrial characteristics, so as to pass on the real and practical development technology to students[2][3]. The relationship between university teaching and scientific research has always been an important topic in higher education research. The research involves higher education management, university curriculum and teaching, and the development and management of university teachers. The combination of scientific research and teaching has been widely recognized by researchers. Therefore, exploring an effective integration model of scientific research and teaching is one of the effective ways to improve the teaching effect of courses[4].

2. Analysis of Current Teaching Situation

Most teachers of software technology major in Wenzhou

Polytechnic have first-line software development experience and rich teaching and research experience, and continue to carry out school enterprise cooperation with China Unicom, China Soft International and other large enterprises, playing a very good role in student training, and continuously sending a batch of skilled talents to various regions. The software technology major has set up a series of courses related to Web front-end development. Among them, Advanced Web front-end development is the core course for sophomores of software technology major in our school. On the basis that students have learned front-end development knowledge, this course focuses on introducing modern engineering front-end development mode and advanced knowledge, It aims to cultivate students' skills in designing and developing Web applications, their ability to adapt to work posts, and their ability to analyze and apply new technologies through task and project practice. As the carrier of course teaching, practice projects are the basis for implementing the integration of theory and practice teaching and cultivating students' practical ability[5][6]. However, in recent years, with the rapid development of new technology, the improvement of school running orientation and the continuous improvement of the quality requirements of regional digital transformation for software talents, the current teaching mode and content are difficult to meet the needs, mainly in the following aspects:

(1) The teaching form and case are single, and students' enthusiasm for learning is weak. Web front-end development courses mainly focus on cultivating students' practical ability. At present, they are mainly taught in the form of combining teaching with practice. The form is relatively simple, and the vitality of the classroom is not enough; Although a series of teaching reforms have been carried out, the content of the course is still not rich enough, and the relevance between tasks is not enough. Besides, most of the teaching projects are traditional simulation projects, such as the mall system, library management system, etc. The students do not have much fresh feelings about such projects, and the actual value of the simulation projects is not great, so the enthusiasm of

learning is affected.

(2) New technologies emerge in endlessly, and reasonable integration methods need to be explored. Web front-end technology is updated rapidly. On average, some new technology frameworks and libraries will appear every two years, which puts forward higher requirements for teachers' curriculum content design. How to choose appropriate new technologies to integrate into teaching is a difficult problem at present. If we break away from the actual needs of the enterprise, and one-sided pursuit of new technologies or retain old technologies, the skills that students eventually master will not be well qualified for the post. Therefore, teachers need to conduct in-depth research on the mature technology framework of enterprises in the process of scientific research, and carry out the technology selection of teaching content from the perspective of enterprise level R&D technology selection, so that the teaching content is mature and stable and can meet the needs of new technologies.

(3) The integration of scientific research and teaching is not enough to effectively form resultant force. At present, teachers have a high enthusiasm for scientific research, and they have presided over and participated in many scientific research projects. However, in the process of scientific research, they often pay more attention to the completion of various indicators, but they have not done enough in the transformation of scientific research achievements, especially in the preliminary stage of teaching reform research using scientific research cases. Therefore, it is necessary to further explore the deep integration of scientific research and teaching, so that the two can form a joint force to work together on talent training.

(4) The integration of scientific research elements into ideological and political teaching is still in the exploratory stage. The importance of carrying out ideological and political education is self-evident, but there are deliberate situations in the current teaching process, and the selection of cases is not natural enough, leading to ideological and political education can not enter the mind. The scientific research projects come from the real needs of enterprises, and are the embodiment of our use of technology to solve enterprise problems and serve the society. At the same time, in the process of scientific research, we also need to have the belief of hard work, honesty and trustworthiness, team assistance, and the style of continuous exploration. These natural ideological and political elements are more likely to resonate with students. At the same time, the introduction of enterprise level development norms can also enhance students' professional quality. Therefore, how to make good use of scientific research projects and carry out ideological and political teaching reform with the aid of scientific research projects is a direction worth exploring.

3. Feeding Back Teaching Practice

The "Qinqing Gas Station" system is a real enterprise project from the School based Research Institute of China Unicom Wenzhou Branch. It was developed by the teacher team of the Software Technology Teaching and Research Office in cooperation with Unicom. The project is implemented using the current mainstream Web development technology. After being put online, it has produced good practical benefits, and has been unanimously recognized by the Wenzhou Enterprise Comprehensive Service Platform and the majority of enterprise users. On the basis of this project, we have carried out the practice of feeding back teaching

reform closely around the requirements of "optimizing talent training and improving teaching quality".

3.1. Reconstruct the teaching content

Each knowledge point of the Web front-end technology is closely related, with strong logic before and after, and focuses on cultivating students' ability to draw inferences from one instance and comprehensive practical ability. In the past, independent tasks often created a sense of separation between knowledge points. Therefore, it is necessary to design from the top level, run projects through the whole teaching process, and connect each task with a main line, so that students can experience the integrity and relevance of knowledge points. From the perspective of talent training program and course teaching objectives, the content of the enterprise's real project "Qinqing Gas Station" system is reconstructed, and it is divided into three levels: basic, medium and extended according to the knowledge and skills involved in the task content. As shown in Figure 1, the basic level mainly involves some learned and relatively basic knowledge points, which are independently completed by students before class according to video and other resources; The middle level involves some new knowledge, the difficulty is moderate and coincides with the teaching objectives, which is broken through by the classroom teaching focus; The expansion level involves knowledge with certain difficulty, which reflects the extension of classroom knowledge, and is completed by extracurricular expansion learning through group cooperation. The three-layer content model can reasonably decompose the real project according to the needs of the curriculum, and more naturally integrate into teaching. It also reflects the idea of hierarchical teaching, which enables students with weak foundation to participate in the project, and allows students who have spare efforts to explore extracurricular expansion.

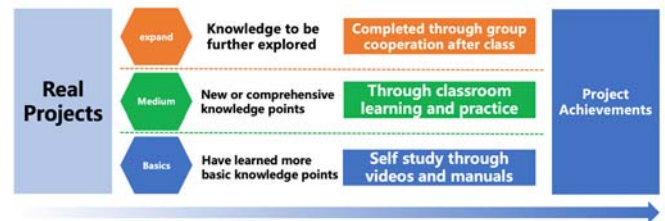


Figure 1. Structure diagram of content mode on the third floor

3.2. Reform teaching mode

The traditional task-based teaching pays more attention to the completion effect of tasks, so it will focus on students' programming ability. The real development process of enterprise software projects includes different stages, such as demand analysis, scheme formulation, difficulty solving, function coding, function testing and software release. It is a must for software development engineers to master the work content of each stage. Therefore, it is necessary to bring the development process of the real project into the classroom while introducing the real project of the enterprise as the teaching content, so that students can simulate the real development environment of the enterprise while learning knowledge and completing practice. We reform the teaching mode based on the software project development process. First, we divide the whole project into multiple stages, from demand analysis to project delivery, so that students can grasp the development process of the whole project. Secondly, for the task of each class, the class is also divided into five major links of "guidance, exploration, practice, testing and

evaluation" according to the real development process of the task. Students are asked to simulate the development team of the enterprise to complete the task in groups, as shown in Figure 2. The two major links of exploration are flexibly arranged twice according to the time of a class, which are divided into basic tasks and optimization tasks. Through the authenticity and process of projects and tasks, students' projects are managed and guided in the whole process according to the enterprise project management process, so that students' theoretical knowledge, practical ability and development experience are improved.

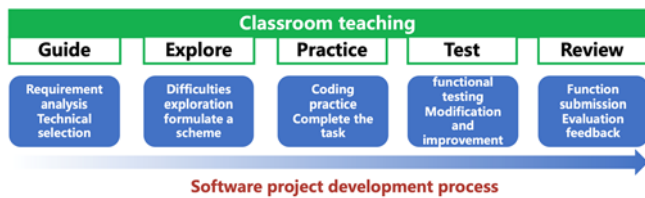


Figure 2. Classroom teaching link diagram based on real software project development process

3.3. Design evaluation system

The acceptance conditions of real projects of enterprises are relatively strict. In addition to the function realization, it also includes the assessment of interface design aesthetics, user interaction experience, software performance, project development cycle and other aspects. On the basis of traditional task result evaluation, a multi evaluation system is established according to enterprise management specifications and software delivery acceptance standards. In terms of evaluation dimension, we should combine knowledge, skills and quality, check students' mastery of knowledge and skills through function completion, and check students' standardization awareness and team awareness through code standardization, team contribution, etc; In terms of evaluation subject, in addition to teacher evaluation and student evaluation, the evaluation of enterprise tutors will also be introduced, which is closer to the real delivery process; In terms of evaluation method, process evaluation and result evaluation are combined to examine students' project development process performance and final project delivery results. With real projects as the carrier, teaching evaluation and project evaluation are integrated through multiple evaluation systems to cultivate students' project practice ability, project management ability and team cooperation ability.

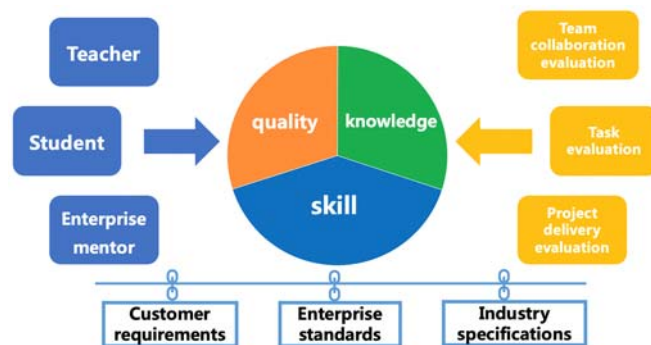


Figure 3. Multi evaluation system

3.4. Integration of ideological and political elements

In the development process of an enterprise's real project, developers need to cooperate with each other and make careful analysis. At the same time, they need to have the spirit of hard work, exploration and excellence. It can be said that the project development process contains rich ideological and political elements. We integrate the science and innovation elements into the classroom, and create a three integration ideological and political education model that integrates speech, content and process. Speech integration means that when teachers explain knowledge points, they integrate their own real experience in the real project development process, such as how to solve difficulties, explore the unknown, how to polish details, optimize experience, etc., so as to arouse students' resonance with real feelings; The content integration is based on the "family gas station" system. Through the function introduction, it realizes the silent integration of the ideological and political elements contained in the project, such as the sense of mission of the government to serve the people, entrepreneurship and software technology to serve the society, and the national self-confidence caused by China's self-developed technology; Process integration refers to the analysis and coding of each task, which enables students to attach importance to teamwork, code specification and software quality, and gradually enhance their professional quality in the process of project practice.

4. Conclusion

With the development of digital economy, new technologies such as artificial intelligence, the Internet of Things, big data and so on emerge in endlessly and are rapidly applied. Higher vocational software courses must also keep pace with the times to cultivate talents more suitable for regional economic development. Without the support of scientific research achievements to the curriculum content, the teaching content is old, and the old classroom is difficult to cultivate creative students. The transformation of scientific research achievements into curriculum content is precisely to highlight the "new" point. For students, no matter where the scientific research achievements of teachers reflect "new", they can inspire students in the teaching process and arouse their interest in learning and research, because these knowledge is more cutting-edge than the existing book knowledge, which is the key to cultivate innovative modern talents. Therefore, at present, the teaching of scientific research feedback is still a research hotspot, and there are still many problems worth exploring on how to integrate scientific research achievements into teaching contents, models, ideological and political aspects in an all-round way. The research of this topic has achieved good results in the process of practice, which has brought new ideas for the follow-up research and teaching. The following strategies are worth referring to:

(1) Through the survey method, we can master the technology and talent needs of enterprises, understand the production process and development mode of enterprises, and in-depth research and analysis can provide guidance for teaching reform, which is more targeted;

(2) The content of the real project of the enterprise cannot be used for teaching because of the difficulty, so the content reconstruction based on the project should be derived from the real project and applied to teaching;

(3) The teaching process needs to be close to the generation process of the enterprise, so we should take the initiative to connect the new processes and methods of the enterprise, and reflect them in the teaching process, so that the learning scene and the work scene can be integrated;

(4) There are many ideological and political elements in scientific research projects and processes worth exploring, which brings new ideas to the ideological and political reform of the curriculum.

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