Research on the Innovation of Software Framework Technology Application Teaching Mode Based on Employment Orientation

Zeng Yingqing

Guangzhou Huashang College, Guangzhou, 511320, China

Abstract: In order to meet the demand of enterprises for talents in the field of software development, the teaching mode of software framework technology application course needs to be innovative, so as to improve the employment rate of college students. According to the current teaching mode of software framework technology application, the problems encountered in the teaching of this course are analyzed. Innovative teaching mode methods such as improving the leading course, "project-oriented" teaching tasks, school-enterprise cooperation, timely updating of teaching materials, establishing teaching resource database, and defense assessment are put forward. The innovative reform of the curriculum indicates that the new teaching mode improves students' interest in learning, improves students' ability to study independently, analyze and solve problems, and communicate, and thus increases the employment rate of college students.

Keywords: software framework technology application, teaching mode, employment, project-oriented teaching, school-enterprise cooperation

1. Introduction

The Software Framework Technology Application Course is a discipline originating from computer science practice. After years of development, it provides talent output for the software development industry and occupies an important position in the field of software development learning. With the development of social economy and the rapid development of computer technology, internet and artificial intelligence, the demand for relevant talents in enterprises is constantly increasing. Especially in the field of software development, due to the continuous innovation of software technology, enterprises have increasingly high requirements for the ability of software development related talents. According to data from major recruitment websites, taking Java software development engineers as an example, the current market requirements for Java software development engineers are follows: ① Solid Java language skills; Familiar with IO, multithreaded programming, and JVM mechanisms; ② Have a deep understanding of mainstream frameworks such as Spring MVC and Boot; ③ Proficient in MySQL, MongoDB, Redis and other database technologies; ④ Familiar with front-end technologies such as HTML, CSS, JavaScript, and Ajex; ⑤ Familiar with TCP/IP andHTTP protocols, familiar with Unix/Linux operating system; ⑥ Have good documentation habits and code writing standards[1]. From this, it can be seen that companies are increasingly strict in their for job applicants.

Many universities in our country have innovated and reformed the construction of software framework technology application courses, but these course reforms often do not reform the course content from the perspective of employment. The teaching materials and professional technologies involved in this course lag behind the actual needs of current enterprises, and the curriculum tends to focus on textbook knowledge and ignore practical applications; The course lacks the cultivation of students' innovative abilities. Therefore, it is urgent to innovate and reform the teaching mode of software framework technology application courses, so as to align the cultivation of software development talents with the employment in the software development market.

2. Current situation of teaching mode

The application course of software framework technology is a specialized course in computer and technology, software engineering, and other majors in multiple universities[2]. Due to the large

number of knowledge points involved in this course, it requires many prerequisite courses as basic knowledge. This course is usually arranged for learning in senior years such as third or fourth year. At present, the course has encountered the following problems in teaching.

2.1 Unreasonable setting of prerequisite courses

Before studying software framework technology application courses, students need to master Java programming, MySQL, Redis and other database technologies, as well as web front-end development technologies. Different universities have different professional courses for majors such as computer science and technology, software engineering, information management, and information systems. Students have different learning foundations for this course, which often leads to a significant discount in the learning effectiveness of this course. Before conducting this course, universities should set up courses such as Java programming and database technology based on the comprehensive level of students in different majors to ensure that students have a certain grasp of the basic knowledge of this course before conducting relevant teaching.

2.2 Incomplete teaching facilities

As a course related to the field of software development, due to its unique characteristics, in order to ensure teaching effectiveness, universities need to invest a large amount of resources to strengthen the school's software and hardware construction. However, many universities currently have outdated teaching laboratory facilities, and the software and hardware settings of computers cannot meet the teaching requirements of this course. For example, some school laboratory computers still use the Win7 system, resulting in a very slow or even non operational Spring Boot project. In addition, many schools have not purchased program development software such as IntelliJ IDEA, and have not installed MySQL software correctly. These issues seriously affect the teaching effectiveness of this course, resulting in many difficulties and limitations in the teaching process. Universities need to strengthen the construction of computer facilities.

2.3 Backward teaching methods

For practical courses such as the application of software framework technology, the traditional teacher centered teaching model is no longer applicable to this course. Students need to learn this course more hands-on, practical, and thoughtful, rather than listening to the teacher's lectures, lacking practical operation. Some teachers still stay in the traditional teaching stage of this course, emphasizing theoretical knowledge rather than practical operation. Moreover, many teachers do not reflect the continuity and connection between the teaching content, and each teaching case is isolated and not related to each other. The result of students using these teaching methods for learning is that the knowledge they learn is fragmented, disorganized, and lacks systematicity[3]. This learning mode does not conform to the actual process of Java development projects. This teaching method is no longer applicable to the rapidly developing curriculum of "software framework technology application".

2.4 Backward teaching materials

As this course is a rapidly developing course in the field of software development, the professional knowledge involved in this course is constantly updated every day. The existing textbooks do not provide sufficient updates on relevant professional knowledge. After studying the existing textbooks, students still need to learn new knowledge on the Spring official website and various blogs and forums in order to meet the market's requirements for software developers. This requires teachers to continuously strengthen their learning of new professional technologies and teach students new software development knowledge.

In summary, the teaching development of software framework technology application courses is influenced by various factors, which limits the development of their teaching models and prevents them from playing an important role in the learning of software development among college students. In order to enhance the role of this course in college students' learning of software development, the traditional teaching mode and existing problems require a series of deep reforms and innovations in order to make the teaching of this course meet our expected teaching objectives.

2.5 Lack of cultivation of students' innovative awareness

Students always learn the content of textbooks in a step-by-step manner or follow the teaching cases of teachers, and due to the lack of integration with cutting-edge technologies and disciplines, students did not apply professional knowledge such as artificial intelligence, big data, and natural language processing in the final course design, making it difficult to form students' innovation awareness and ability[4].

In response to the above issues, the practical teaching content of software framework technology application should be integrated and expanded to meet the requirements of new engineering construction. In order to enhance the depth and breadth of practical teaching content, software framework technology application courses will be deeply integrated with subject areas, practical application scenarios, and cutting-edge technologies. The purpose of this study is to promote the deep integration of advanced information technology and curriculum teaching, enhance students' practical ability, innovative awareness and ability, enhance students' ability to analyze and solve complex engineering problems, and provide support for cultivating composite talents with modern perspectives and innovative abilities that adapt to the construction of new engineering disciplines..

3. Innovation in the Teaching Mode of Software Framework Technology Application Course

This teaching model innovation aims to enhance and enhance the teaching content of the software framework technology innovation course in different dimensions such as depth, breadth, complexity, and comprehensiveness. It aims to establish a teaching model that is suitable for the requirements of the new engineering discipline, covers interdisciplinary knowledge, and combines practical application backgrounds to promote the cultivation of innovative talents. The overall idea of innovation is shown in Figure 1.
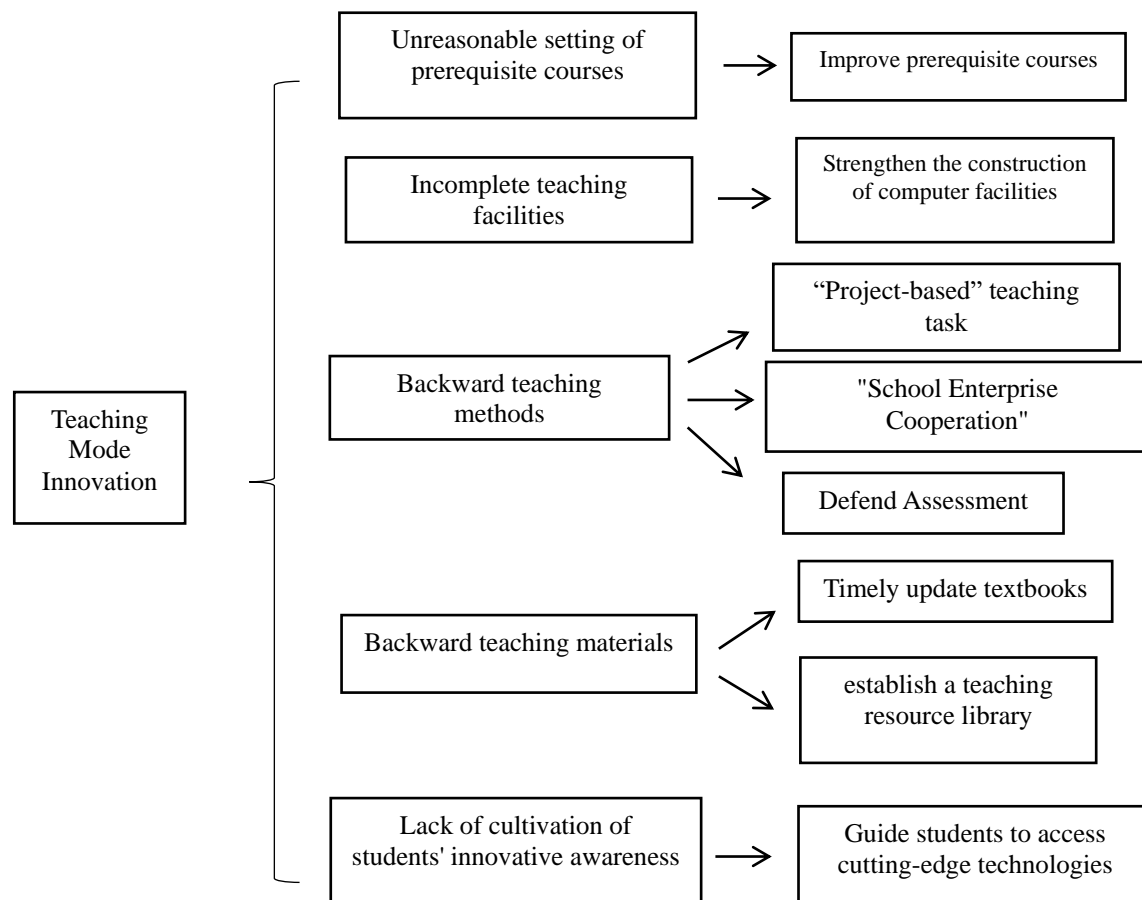

Figure 1. The Overall Idea of Innovation

3.1 Improve prerequisite courses

The arrangement of prerequisite courses for software framework technology application courses varies among different universities. Generally speaking, courses such as Java programming, MySQL, Redis and other database technologies, and web front-end development, as prerequisite courses for software framework technology application, need to be arranged in advance for students to study. However, due to the different learning requirements and software development foundations of students in different majors, the arrangement of prerequisite courses in universities is often unsatisfactory. If students have not studied relevant prerequisite courses, such as the basic knowledge of database and web front-end development, they may not be able to keep up with the course progress and lose confidence in learning to use Spring Boot for data access, project course design, and other content[5]. Therefore, for universities, before carrying out software framework technology application courses, it is necessary to improve the relevant prerequisite courses, and arrange the teaching of relevant courses reasonably based on the course construction of different majors.

3.2 "Project-based" teaching task

In order to provide students with a more systematic and holistic learning experience of software framework technology application courses, and to understand the development process of actual software development projects, project-based teaching is applied in the teaching process to enhance students' ability to analyze and solve problems.

The "project-based teaching method" is a behavior guided teaching form, which takes the project as the main body and guides several tasks in the project. It breaks through the limitations of traditional teaching methods in isolating knowledge. It centers on a common task and is driven by interrelated questions. Through the active application of learning knowledge points, students are guided to learn and explore independently with real projects, guiding them to actively Consciously generate a practical activity[6]. The key to project-based teaching method lies in the transformation of ideas. It transforms the traditional teaching method centered on imparting knowledge into an interactive teaching method centered on completing tasks and solving problems. It transforms validation based teaching into inquiry based teaching, allowing students to learn independently and actively construct knowledge. Under the guidance of teachers, students learn through exploration with real tasks.

Java itself is a highly practical programming course. Therefore, in the classroom, with teachers as the lead, a project runs through the entire teaching process, with students as the main body, and completes a series of tasks from shallow to deep according to the teacher's guidance and project requirements. Students participate in the entire process of project implementation in their learning, as if they are in a real software development environment. This stimulates students' inner desire for learning, activates their inner potential, and improves their innovation, analysis, and problem-solving abilities.

The teacher first identifies 1-3 small projects with moderate difficulty and complete functionality (such as blogs, teaching management systems, and graduation thesis management systems). The project topic is not suitable, too difficult or too easy. Choosing too difficult projects can make it difficult for students to learn, resulting in a loss of confidence in learning and a lack of sense of achievement from learning. Choosing projects that are too easy, students feel that they are too simple and will not think and explore, thus neglecting the classroom. Project topics should be novel and timely in order to maximize students' learning enthusiasm. In addition, the project should cover a wide range of knowledge. For example, it is best for the project to cover knowledge points such as Spring Boot data access, Spring MVC, cache management, user authentication, permission management, and message services. Next, the teacher arranges students to complete different tasks according to the project process, from requirement analysis, outline design, detailed design to code implementation. Students can also be assigned different tasks according to different functional modules of the project (such as user authentication and permission management module, blog article addition, deletion, and modification management module, etc.). Students can choose different projects and divide them into several groups, with no more than 4 people in each group, to learn different projects together. Teachers guide students in software development projects, provide prompts for problems encountered by students, and try to help students find solutions to problems. This project-based approach to teaching tasks can create a relatively free learning environment for students, improve their self-learning ability, and enable them to better understand the workflow of enterprise software development and adapt to the employment environment.

3.3 Increase practical opportunities through "school enterprise cooperation"

The application of software framework technology is a highly practical course. If teachers only impart theoretical knowledge to students based on the knowledge points in the textbook, students cannot effectively apply textbook knowledge to actual software development. So universities can adopt a "school enterprise cooperation" approach to promote cooperation with excellent enterprises, thereby increasing the opportunities for students to apply software development knowledge in practice[7]. After the school collaborates with relevant enterprises, a software development project is established to enable students to participate together. This teaching mode changes the traditional teacher centered teaching method, turning students into the main body of teaching, guiding students to complete a series of learning tasks from requirements analysis, overall design, detailed design, code implementation, testing and online according to the project development process, from shallow to deep. Various extracurricular activities can also be carried out based on the curriculum of different semesters, such as enterprise visits, software development competitions, and lectures on software development technology by outstanding talents in enterprises. This approach can help students better adapt to the requirements of software developers in enterprises, and thus better employment opportunities.

3.4 Timely update textbooks and courseware and establish a teaching resource library

The software framework technology application course has a high requirement for the timeliness of professional knowledge, and relying solely on relevant teaching materials is far from enough to meet the market's requirements for software developers' professional knowledge. This requires teachers to update relevant textbooks and courseware in a timely manner, and use the Super Star Learning Platform to help teachers organize their learning experience, achievements, and professional knowledge in their research and development work into different cases. Different cases should include case introductions, detailed designs, source code, literature materials, etc. to form a teaching database, and teachers need to continuously improve this database in future teaching. Only in this way can the latest technologies and research achievements in the field of software development be taught to students, and the teaching content be enriched and updated.

3.5 Assessment will be conducted in the form of defense

For courses that emphasize practicality such as software framework technology application, the traditional closed book assessment method can no longer be used to evaluate students' learning outcomes in this course. Due to the fact that students learn in small groups during the teaching process, the final assessment and evaluation can also take the form of group defense. Students can choose suitable projects for development, and each person is responsible for different modules. Based on their completed content, they will present relevant exhibitions and code explanations on stage. The teacher will then ask relevant questions based on the students' presentations to assess their learning outcomes in the course. The assessment in the form of defense can enable students to better understand the process of displaying project results in enterprises, improve their self-learning ability, communication ability, language expression ability, and adaptability.

3.6 Cultivate students' innovative awareness

The explosive development of artificial intelligence technology is leading a new round of industrial revolution, from intelligent manufacturing and agriculture to intelligent education, intelligent retail, and intelligent transportation. Artificial intelligence technology plays a driving role in various industries of the national economy. The core and foundation of artificial intelligence is programming, so artificial intelligence technology should be integrated into the design of course teaching cases, consciously guiding students to be exposed to cutting-edge information technology, and cultivating their innovation awareness and ability[8]. Many basic operations and key algorithms in artificial intelligence have been simplified and abstracted, and can be achieved through the basic knowledge in the course: linear regression, cross entropy calculation, data normalization and standardization in machine learning, image filtering, image convolution operation, image edge detection, image feature calculation in computer vision, Chinese word segmentation, word frequency calculation, similarity calculation, word cloud, etc. in natural language processing. By designing corresponding cases, students can be guided to further learn artificial intelligence technology, design innovative products or applications, and consciously apply advanced information technology to traditional industrial fields in their future professional studies and work.

4. Conclusion

The innovation and reform practice of teaching mode in the application of software framework technology shows that the teaching mode of this course is innovated and reformed to a certain extent, guided by employment, by improving the prerequisite courses, "project-based" teaching tasks, "school enterprise cooperation" to increase students' practical opportunities, using the form of defense assessment, and cultivating students' innovation awareness, and achieving significant teaching results. Students' interest in learning, self-directed learning ability, analytical and problem-solving abilities, and communication skills have greatly improved. The employment rate of students in the field of software development has also increased as a result. Next, we will make modifications to address the specific implementation issues, further reform the teaching content, teaching methods, and teaching models, especially strengthen the deep connection between software framework technology application courses and the employment of software development personnel, in order to cultivate more software development talents that are suitable for today's social development, and thereby improve the employment rate of university students.

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