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Exploration and practice of OBE-based JavaEE framework technology course practice teaching reform under the integration of industry and education

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Abstract: This study focuses on the "Practical Teaching Reform of OBE-based JavaEE Framework Technology Course under the Integration of Industry and Education", and aims to optimize the teaching design and implementation path of JavaEE framework technology course by introducing the concept of OBE (Outcome-Oriented Education) and combining the teaching mode of integration of industry and education. Firstly, this paper analyzes the current teaching status of JavaEE framework courses and the gap between them and industry needs, and points out the problems of slow updating of course content and weak practical links. Subsequently, the idea of curriculum reform based on the concept of OBE was proposed, including clarifying the outcome-oriented teaching objectives, optimizing the curriculum content design, reconstructing the practical teaching mode, and strengthening the school-enterprise cooperation mechanism. Through the introduction of enterprise projects, the construction of a dual tutor system, and the continuous monitoring and improvement of teaching effectiveness through the OBE-oriented evaluation system, it aims to improve students' practical ability and employment adaptability. The study also puts forward the specific application of school-enterprise cooperation in curriculum design and teaching implementation, emphasizing the in-depth participation of enterprises in project introduction, curriculum design, and practical training guidance. Finally, this paper summarizes the effectiveness of teaching reform and looks forward to the direction of JavaEE curriculum reform in the future.

1. Introduction

1.1 Background

The integration of industry and education and Outcome-Based Education (OBE) are of great significance in the reform of modern vocational education. With the rapid development of information technology, the demand for JavaEE framework technology as a key tool for enterprise development is increasing. How to cultivate high-quality talents who not only master the theory of JavaEE framework, but also could develop practical projects has become an urgent task of teaching

reform. However, the current JavaEE framework courses usually focus on theoretical teaching, ignore the improvement of students' practical ability, and are out of touch with the needs of the industry, which makes it difficult for students to quickly adapt to corporate positions after graduation. Therefore, based on the concept of OBE, the teaching reform through the integration of industry and education will help to improve the comprehensive ability of students.

1.2 Research significance

By introducing the concept of OBE, taking "results-oriented" and closely linking students' learning outcomes with the actual needs of enterprises, it can help students better adapt to professional positions. The integration of industry and education introduces the actual projects of enterprises into the curriculum and adds practical teaching links, which can not only strengthen students' hands-on ability, but also improve their ability to solve practical problems. Therefore, this study aims to explore how to optimize the teaching mode of JavaEE framework technology courses through the combination of OBE concept and integration of industry and education and improve the teaching quality and students' employability competitiveness.

2. Current Status and Needs of JavaEE Framework Courses

2.1 Status quo of JavaEE framework technology courses

The current JavaEE framework technology courses are mainly based on theoretical teaching, and the practical links are relatively weak, especially in colleges and universities, although students can master the basic technical concepts and framework architecture but lack the opportunity to participate in practical projects. In addition, the course content is slow to update and fails to keep up with the latest developments in JavaEE technology, resulting in students lacking skills when applying for jobs. At the same time, most of the course teaching is out of touch with the actual needs of enterprises.

2.2 Introduction of the OBE concept

OBE is an outcome-oriented teaching concept that emphasizes the design of teaching content and assessment criteria with predetermined learning outcomes as the goal. By introducing the OBE concept, the JavaEE framework course can clarify the expected outcomes and set specific learning outcome goals according to the actual needs of enterprises for talents, such as students' technical skills, project development skills, teamwork skills, etc. The core of OBE is outcome-oriented, which can promote the transformation of teaching from "teaching" to "learning" and improve students' self-directed learning ability.

2.3 Demand for Industry-Education Integration

The demand for technical talents in the JavaEE framework is not limited to theoretical knowledge, but also pays more attention to practical project experience. Through the integration of industry and education, enterprises can provide practical project cases for the course to help students apply what they have learned in a real-world environment and improve their practical ability. In addition, enterprises can also cooperate with universities to provide the latest technology needs and development trends to ensure that the course content is cutting-edge and practical, to better meet the needs of enterprises.

3. OBE-Based Reform Ideas for JavaEE Curriculum

3.1 Demand for Industry-Education Integration

Under the guidance of the OBE Concept, the JavaEE Framework Technology Course should first identify the outcome goals that students should achieve at the end of the course. These outcome objectives should include technical competence, project development competency and overall professionalism. By analyzing the specific needs of enterprises for JavaEE technical talents, set specific learning goals, such as mastering the JavaEE core technology stack, being able to develop enterprise-level applications independently, and having teamwork and problem-solving skills. These outcomes will form the core of curriculum design and assessment, ensuring that students have a clear direction in their learning process and ultimately achieve a seamless alignment with the needs of the business.

3.2 Optimization of teaching content design

OBE-based curriculum design requires that teaching content be closely integrated with the expected learning outcomes. Therefore, in the JavaEE framework course, the teaching content should be based on real enterprise projects, and students should apply what they have learned in a real development environment through project-driven learning. The design of teaching content should be dynamically adjusted, keep up with the latest development of JavaEE technology in a timely manner, and introduce relevant technical modules according to the needs of enterprises, such as microservice architecture, container technology, cloud computing, etc. At the same time, through the teaching design under the guidance of the OBE concept, theory and practice are combined to ensure that students can not only master the core theoretical knowledge, but also have practical ability.

3.3 Reconstruction of the practical teaching model

Based on the OBE concept and the requirements of the integration model of industry and education, the practical teaching mode needs to be comprehensively reconstructed. In the new teaching model, an integrated teaching model of "theory, practice, project" should be designed through school-enterprise cooperation. Specifically, theoretical teaching is the foundation, practical links are supplemented, and project training is the core. Through the introduction of practical projects in enterprises, students can understand the application scenarios of theoretical knowledge in practice. In addition, corporate mentors work with on-campus faculty to guide students in project development, enabling students to gain hands-on experience through real-world projects, while mastering key competencies such as teamwork, communication, and project management.

4. School-Enterprise Cooperation in Industry Integration

4.1 Models and Paths for School-Enterprise Cooperation

The school-enterprise cooperation model of industry-education integration is one of the core links of the technical curriculum reform of the JavaEE framework. Through school-enterprise cooperation, enterprises can provide real project cases and technical requirements to help schools design teaching content that is closer to reality. Enterprise tutors can regularly come to the school to teach, participate in project training, and guide students to complete enterprise projects. In addition, schools can co-develop courses with enterprises and ensure that the teaching content meets industry standards by jointly formulating curriculum standards, so as to meet the actual needs of enterprises for technical

talents. At the same time, the school can also establish a long-term cooperation mechanism with enterprises, build off-campus training bases, and regularly organize students to go to enterprises for project training to improve students' professional quality.

4.2 Models and Pathways for School-Enterprise Cooperation

The participation of enterprises in course design is not only reflected in the provision of projects, but also provides opinions for the design of courses through technology updates and industry demand analysis. Enterprise tutors can directly participate in the formulation of the course to ensure that the course content can cover the current development direction and practical application scenarios of the enterprise's current technology. In the process of teaching implementation, enterprise tutors can jointly teach with teachers in the school and bring the latest technology application scenarios into the classroom through enterprise project training, so that students can understand the practical application of technology more intuitively in the learning process. At the same time, enterprises can evaluate students' performance through practical training projects to help schools provide feedback and improvement on teaching effectiveness.

4.3 Application and practice of the dual tutor system

In the mode of integration of industry and education, the dual tutor system composed of enterprise tutors and on-campus teachers can effectively improve students' practical ability. Corporate mentors have rich experience in project development and industry backgrounds and can provide students with technical guidance in practical projects, while on-campus teachers have the advantage of theoretical teaching and can help students better understand the theoretical foundations of the JavaEE framework. Under the dual tutor system, students can not only obtain systematic training in theoretical knowledge, but also understand the latest trends in the industry and improve their ability to deal with complex projects through the practical guidance of corporate mentors. This dual-tutor training model can help students accumulate certain project experience during their time in school and lay a solid foundation for future employment.

5. Implementation of OBE-based teaching reforms

5.1 Implementation steps of teaching reform

When implementing teaching reform, it is first necessary to set clear curriculum outcome goals according to the OBE concept, and design curriculum content and teaching plans according to these goals. Next, the school needs to establish a school-enterprise cooperation mechanism and introduce enterprise mentors and projects to ensure the authenticity and practicality of practical teaching. In the implementation of teaching, theoretical and practical courses need to be carried out simultaneously, and students' learning outcomes should be regularly assessed. The practical training of the project requires the joint guidance of enterprise mentors and teachers in the school to ensure that students can gain practical development experience in the project. In addition, in the process of implementing the reform, the teaching content and teaching methods should be adjusted and optimized in a timely manner through student feedback and enterprise evaluation to ensure the effectiveness of the reform.[1]

5.2 Integrating Classroom and Practical Teaching

The teaching reform based on the OBE concept requires the organic combination of classroom

teaching and practical teaching. In classroom teaching, the explanation of theoretical knowledge needs to be closely combined with practical application scenarios, and students can effectively combine theory and practice through case teaching and discussion-based teaching. In the practical teaching session, students can apply the knowledge they have learned in a real project development environment and further deepen their understanding of the theory through practical training on enterprise projects. The organic combination of theoretical courses and practical courses can effectively improve students' learning effect, so that they not only have a solid theoretical foundation, but also can cope with practical problems in practice.[2]

5.3 Continuous Improvement Mechanism

The successful implementation of teaching reform is inseparable from the continuous improvement mechanism. Through OBE's outcome-based assessment system, schools are required to regularly assess students' learning outcomes and make curriculum adjustments based on the assessment results. At the same time, feedback from enterprises is also an important basis for curriculum improvement. Through the evaluation of students' performance in enterprise training and project completion, the school can find out the problems in teaching in time and optimize the teaching mode by adjusting the course content and adding practical links. The implementation of continuous improvement mechanism can ensure that the course content is always in line with the needs of the industry, and help students better adapt to the requirements of corporate positions after graduation.

6. Evaluating and Improving Teaching Effectiveness

6.1 OBE-oriented assessment system construction

The OBE concept emphasizes outcome-oriented, so the construction of the evaluation system is an important part to ensure the teaching effect. In the JavaEE framework course, students' learning outcomes should be assessed in multiple dimensions, including technical knowledge, project development ability, teamwork ability, etc. Through a combination of process assessment and summative assessment, the learning effect of students is comprehensively evaluated. The process evaluation can be carried out through phased assignments, class discussions, project progress, etc., while the final evaluation is carried out through the enterprise project training and the presentation and feedback of the final project. The joint involvement of corporate mentors and teachers in the school will ensure the objectivity and comprehensiveness of the assessment results.[3]

6.2 Assessing Student Employability and Job Adaptability

Under the integration of industry and education, whether students can successfully find employment and adapt to job requirements after graduation is an important criterion to measure the effectiveness of teaching reform. Therefore, students' employability and job adaptability should be an important part of the assessment system. Through cooperation with enterprises, schools can track the employment of graduates, understand the performance of students in enterprises, and adjust course content and teaching methods based on corporate feedback. At the same time, the school can also understand the requirements of enterprises for graduates' professionalism, technical ability and comprehensive ability through research, and further optimize the curriculum to ensure that students can be competitive in the job market.[4]

6.3 Path and measures of continuous improvement

Continuous improvement is the key to ensuring the long-term results of teaching reform. Based on the OBE-oriented assessment system, schools should adjust the curriculum content, teaching methods and practice links in a timely manner according to the evaluation results. At the same time, the continuous deepening of school-enterprise cooperation will also provide a new direction for the improvement of the curriculum. By introducing more enterprise projects, optimizing the training process, and introducing new technical modules, such as microservices, containerized deployment, etc., to ensure that the course content keeps pace with the times. In addition, schools should also establish a feedback mechanism, regularly collect opinions from students and enterprises, identify problems in teaching in a timely manner, and continuously improve the quality of teaching by adjusting teaching design and implementation strategies.

7. Conclusions and Prospects

7.1 Research summary

Based on the OBE concept and the integration model of industry and education, the reform of JavaEE framework technology curriculum has significantly improved the learning effect and practical ability of students by optimizing the course design, introducing enterprise project training, and building a dual tutor system. The research shows that the reformed curriculum can effectively make up for the shortcomings of the traditional teaching mode, so that students can master the theory of JavaEE framework and have practical project development experience, so that they can better adapt to the requirements of enterprise positions. In addition, the in-depth promotion of school-enterprise cooperation also provides a solid foundation for the continuous improvement and optimization of the curriculum.[5]

7.2 Future prospects

In the future, with the continuous development of information technology, the teaching reform of JavaEE framework technology courses will be further deepened. The combination of the OBE concept and the integration model of industry and education will become a reference model for other technical curriculum reforms. At the same time, the school should strengthen cooperation with more enterprises, further expand the depth and breadth of the integration of industry and education and provide students with more practical opportunities. In addition, as technology continues to evolve, curriculum content and teaching models should also be constantly adjusted to ensure that students are always at the forefront of the industry and skills, so that they can be more competitive in the future job market.

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