Exploration of Curriculum Teaching Reform under the Background of 'Post Course Competition Certificate' Integration

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ABSTRACT. In order to enhance students' practical abilities and improve the comprehensive education mechanism of 'Post Course Competition Certificate', research has been conducted on the curriculum reform of "virtualization technology" in vocational colleges. By analayzing the requirements of enterprise job capabilities, the content of vocational skill level certificates, and the content of vocational skill competitions, this paper proposed reform measures for the "virtualization technology" course from the perspectives of reconstructing teaching content, improving teaching models, and optimizing assessment methods, in order to improve the teaching quality of the "virtualization technology" course and enhance students' practical abilities.

Keywords: post-course-competition-certificate, virtualization technology, teaching contents, teaching model.

1   Introduction

The 'post course competition certificate' integration is an important mode to cultivate compound skilled talents [1]. The integration of post requirements, competition projects and certificate contents into professional courses is of great significance to the cultivation of high-quality technical and skilled talents and the promotion of vocational education and teaching reform [2]. Fu Yu carried out the reform exploration and practice of the "intelligent warehouse management" course of modern logistics management specialty based on 'post course competition certificate' integration [3]. Deng Hong put forward the methods and strategies of teaching reform based on the 'post course competition certificate' integration [4]. Taking the course of " International Freight Forwarding Practice " as an example, Zhu Xiting analyzed the connotation and path of 'post course competition certificate' integration, and put forward specific measures for curriculum teaching reform from the aspects of adjusting teaching objectives, reconstructing teaching content, improving digital resources and optimizing multiple assessment and evaluation systems[5].

Taking the course of" virtualization technology ' as an example, the reform measures of "Virtualization Technology" course are researched in teaching content, teaching mode and assessment method on the basis of analyzing the connotation of ' post course competition certificate ', and drawing on the existing teaching reform experience

2   The Connotation of 'Post Course Competition Certificate'

'Post ' refers to the ability demand of professional post[6], which is the key to talent training. 'Course ' refers to the course, which can achieve the goal of talent training ; 'Competition ' refers to the vocational skills competition, which promotes teaching, promotes students ' learning and tests teaching results through the competition. 'Certificate ' refers to all kinds of vocational qualification certificates and vocational skill level certificates, which evaluate and test students ' knowledge level and skill level. 'Class ' is the core, which closely integrates ' post ', ' competition ' and ' certificate ', and promotes teaching in the way of job-course combination, course-certificate Integration, and competition-course integration. The job-course combination refers to the close connection of teaching content with post professional standards; course-certificate integration refers to the introduction of vocational skill standards into teaching content. The competition-course integration refers to the integration of new technologies, new standards and new norms in the competition into the curriculum standards[7]. The mismatch between professional courses and industrial development will be improved. The 'post course competition certificate' integration is conducive to solving the problems of insufficient matching between higher vocational students ' ability and position, the gap between students ' skill level and the requirements of vocational skill competition, and the insufficient integration of " 1 + X " vocational skill level certificate content and teaching content.

3   "Virtualization Technology" Curriculum Reform Measures

The content of the "Virtualization Technology" course covers areas such as network, storage, resource management, virtual machine management and operation. There are many knowledge and skill points. However, the practical experiments are only set for a certain skill point. After completing the learning, students cannot use the knowledge they have learned to solve practical problems. The teaching mode is mainly based on teacher lectures, and students have a weak grasp of theoretical knowledge and lack the ability to solve problems. The assessment method adopts a combination of regular grades and final exams. The regular grades consist of three parts: attendance, home-work, and classroom questioning. The final exams are mainly assessed in the form of test papers, which account for a large proportion and neglect the learning process and knowledge mastery of students.

To solve the problems existing in the "virtualization technology" course, the "vir-tualization technology" course is based on the integration of "Post Course Competi-

tion Certificate ", reconstructing teaching content, improving teaching modes, and optimizing assessment methods.

3.1   The reconstruction of teaching content

In order to better incorporate new technologies, processes, standards, and typical production cases into teaching content, the teaching content of the "Virtualization Technology" course is reconstructed based on job responsibilities, "1+X" cloud computing platform operation and development certificate, cloud computing skills competition content, etc.

3.1.1. Job-Course Combination

The teaching content of "virtualization technology" curriculum mainly focuses on building and operating virtual servers. Through the course, students can be competent in the positions of virtualization engineers and virtualization operation and maintenance engineer.

The teaching team conducted research on cloud computing enterprises, held professional construction seminars, and searched for positions using the keyword virtualization on the Zhaopin.com to view the job responsibilities of employers for virtualization engineers and virtualization operation and maintenance engineers, as well as the skill requirements for college graduates. After analysis and summary, the job responsibilities and skill requirements for virtualization engineers and virtualization operation and maintenance engineers were determined.

The job responsibilities of virtualization engineer includes mainly (1) responsible for VMware virtualization platform and VMware software involved in the platform, Windows / Linux system, server storage device hardware implementation, operation and maintenance, troubleshooting, security inspection;(2)design the schemes of virtual machine migration, backup;(3)responsible for the development of virtualization (VMWare, Citrix, hyper-v and other mainstream virtualization) and PC server related scheme.

The skill requirements of virtualization engineer includes mainly (1) familiar with the configuration of VMware(vSphere, vSan, vrp, etc.)and KVM,VM migration, performance tuning, testing; (2)skillfully master basic operations related to VMware vCenter (virtual machine creation/snapshot/delete/disk management/template creation);(3) familiar with VMware storage, disaster recovery, network, security, upgrade, virtual machine management, monitoring and performance, have the ability to independently complete the construction and management of the virtualized environment;(4)familiar with VMware patch update scheme;(5)familiar with Windows/Linux/ virtualization system management

The job responsibilities of virtualization operation and maintenance engineer includes mainly(1) responsible for the daily maintenance of VMWare virtualization platform and vSAN complex fault handling to ensure its stability and ensure customer business continuity; (2) responsible for writing operation and maintenance management documents, well-organized troubleshooting documents and performance analy-

sis documents of the virtualization platform; (3) responsible for virtualization performance monitoring, Perform regular health check on virtualization.

The skill requirements of virtualization operation and maintenance engineer includes mainly(1) install and debug vSphere and troubleshoot faults；(2) master the basic skills of virtualization network, complete the basic configuration and operation and maintenance work;(3) familiar with configuration management of VMware virtualization software, understand the underlying working mechanism of VMware;(4) proficient in VMware virtualization architectures (vSphere / vSAN / NSX, etc.)

In terms of integrating job responsibilities and teaching content, a survey- analysis-splitting-integration approach is adopted. The teaching team closely follows the development trends of cloud computing technology and virtualization technology, breaks down the skill requirements corresponding to typical job positions according to knowledge and skill points, organizes and integrates them into teaching content, and achieves the integration of courses and professional positions. For example, the virtualization operation and maintenance engineer position includes the skill requirement of "installing, debugging, and troubleshooting vSphere". Although the teaching content includes the installation and debugging of vSphere, there is less mention of troubleshooting. The solution is to integrate the skill points into the specific project. When there is a problem using the skill points, the problem is solved in a progressive way of ' individual-group-all students-teacher-summary '. In this way, students ' ability to solve problems and sense of teamwork can be cultivated. At the same time, in the process of Job-Course combination, professional ethics, professional awareness, etc. are integrated with curriculum ideological and political education in the curriculum, cultivating students' professional qualities in a subtle and silent way.

3.1.2 Course-Certificate Integration

The "1+X" cloud computing platform operation and development vocational skill level certificate is one of the certifications that students majoring in cloud computing technology applications need to obtain. In terms of certification content, this certificate includes seven parts: engineering project document writing, enterprise private network construction and operation, Linux system and service construction and operation, application system distributed construction and operation, private cloud technology, public cloud technology, and container cloud technology. In terms of assessment, the certification exam consists of two parts: a theoretical exam and a practical exam. The installation and deployment of virtual networks in the operation and maintenance of the enterprise private network, the use of VMware virtual machines in the private cloud technology, the installation and deployment of cloud hosts, and the management of public cloud resources and clusters in public cloud technology are all related to the teaching content of the "virtualization technology" course.

To better integrate the knowledge and skills involved in the certificate into the "virtualization technology" course, the content of the certificate was sorted and analyzed. On the basis of existing course resources, the course-certificate integration is carried out through content reinforcement, content repair, and ability transformation. The content enhancement refers to strengthening the knowledge and skills points

related to the course content in the "1+X" cloud computing platform operation and development vocational skill level certificate. For example, during the certificate authentication process, the practical operation needs to install VMware virtual machines. The knowledge points involved in this section of the "Virtualization Technology" course will be strengthened based on the certificate content, including the installation of different operating systems, hardware settings, network configuration of virtual machines, so that students can proficiently use virtual machines in practical environments. The content patching is the process of integrating missing content into the teaching content after comparing the certificate with the teaching content. For example, the content on engineering project document writing in the certificate is involved, but it is not included in the course. Integrating the content of project document writing into the task of each project can help students master this knowledge through practical experience. The ability transformation refers to the ability to transform learned knowledge and skills into problem-solving abilities. The main approach is to convert actual enterprise projects into teaching projects, helping students use the knowledge they have learned to solve practical problems.

3.1.3 Competition-Course Integration

The role of vocational skills competitions is to test the effectiveness of education and teaching, and to achieve the goal of promoting teaching by competition and promoting learning by competition. The cloud computing technology application major mainly participates in the national vocational students skills competition-cloud computing competition. This competition mainly includes the construction and operation of private cloud, the construction, application deployment and operation of container cloud, and the construction, application deployment and operation of public cloud. In the competition, the focus is on testing the comprehensive ability, adaptability, and professional competence of the participating students, with a focus on the comprehensive application of certain skills and the ability to complete certain work tasks.

The test questions of the competition such as virtual machine installation and deployment, cloud host installation and deployment, cloud host management, cloud storage and network configuration, cloud host resource pooling, and cloud host operation and maintenance are input into the course question bank. At the same time, the industry standards such as GB/T 40690-2021 Information Technology Cloud Computing Intercloud Computing Reference Architecture and Information Security Technology Cloud Computing Service Security Capability Requirements applied in the competition will be integrated into daily teaching and training to standardize and standardize teaching.

The teaching content of " Virtualization Technology " course is reconstructed into six projects : VMware Workstation deployment implementation, VMware ESXi deployment implementation, vCenter Server deployment implementation, server virtualization basic configuration, server virtualization high availability deployment and implementation, virtualization operation and maintenance. Each project is composed of sub-tasks, the course includes 15 sub-tasks. Each project and task are interrelated and designed to complete the case. Professional skills are dispersed into multiple tasks,

and each task has a different focus on ability training. The cultivation of students ' logical thinking ability and practical ability spirals up with the advancement of tasks.

3.2   The improvement of teaching mode

In order to better implement the teaching content, the original teaching mode will be adjusted to a combination of online and offline forms of "three stages and six links". Enterprise engineers and teachers implement progressive teaching in three stages before, during, and after class, and implement teaching content through six stages: clarifying tasks, learning new knowledge, understanding principles, conducting practical operations, evaluating results, and expanding perspectives. This model gradually enhances students' ability to learn independently.

In the pre class stage, teachers release teaching tasks and course resources, and students complete pre class preview. With the help of the Beixin online platform, teachers can publish teaching tasks, PPT, videos, experimental guides, pre class tests, and other content; Students should clarify their teaching tasks, learn independently, and complete pre class content previews and pre class tests; teachers should adjust their teaching strategies in time based on the test results of students.

The class stage mainly focuses on offline teaching, and teachers and students jointly discuss the key and difficult content of teaching. At this stage, students learn new theories and principles through the two stages of learning new knowledge and understanding principles, and work together with the teacher to solve the problems encountered during pre class preview. Teachers use the functions of online platforms such as selecting and answering questions to randomly select students to answer questions, understand their mastery of knowledge points, and give appropriate bonus points to stimulate their learning enthusiasm. Students collaborate in groups to complete practical exercises, complete projects, submit project results, and present them. Teachers and students respectively rate the project results and summarize and analyze the problems that arise during the project implementation process.

In the after-school stage, teachers guide students to consult materials, broaden their horizons, and consolidate the knowledge they have learned. Students use the online platform to review, complete online assignments, online tests, and expand learning content. According to the learning situation of students, the teacher tracks the learning effect of students and understands the learning situation of each student.

3.3   Optimization of assessment methods

In order to test the effect of the reconstruction of teaching content, the assessment method of ' virtualization technology ' course is optimized. The course assessment method adopts a combination of process evaluation (70%) and summary evaluation (30%). Teachers and enterprise engineers participate in process evaluation and summative evaluation together. Process evaluation mainly includes the completion of online platform check-in, topic discussion, in-class practice, answering, voting, offline classroom situation and project completion. Summary evaluation is carried out in the form of schoolwork. This assessment method can examine students ' learning

situation from many aspects and perspectives, and highlight students ' application ability assessment.

4   Conclusion

According to the requirements of virtualization engineers and operation and maintenance engineers, the teaching content of the 'virtualization technology' course is reconstructed based on the actual project of the enterprise and the '1 + X' cloud computing platform operation and maintenance and development vocational skill level certificate. The teaching content is connected with the teaching standards of the Ministry of Education and the industry enterprise standards. The teaching content is closer to the needs of the enterprise, and improves the students' vocational skills. The teaching mode adopts the method of ' three stages, six links' online and offline combination, which plays a certain role in cultivating students' autonomous learning. The course assessment method composed of process theory test and comprehensive practice project is adopted to solve the problems of single teaching evaluation method and lack of objective quantitative analysis.

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