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Teaching Methods and Practice of Shell Programming for Cloud Computing Major in Higher Vocational Colleges

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Abstract: With the rapid development of cloud computing technology, computer-related majors in higher vocational colleges have gradually set up cloud computing courses, among which Shell programming teaching is an important link to train students' practical ability. This paper analyzes the current situation of Shell programming teaching in cloud computing courses in higher vocational colleges, discusses the difficulties encountered by students in Shell programming learning, and puts forward the corresponding teaching methods and practical strategies. The teaching mode of "theory explanation + case analysis + project practice" is put forward. Through the practice links of cloud platform construction, image construction and cloud host construction application, students can combine theoretical knowledge with practical operation to improve students' hands-on ability and problem solving ability. This paper also explores ways to enhance teaching quality and stimulate students' interest in learning through teaching reforms, as well as how to strengthen practical skills training by fostering school-enterprise collaboration. The research results show that through the implementation of the above teaching methods and practical strategies, the ability of cloud computing major students in Shell programming can improve and it can train qualified technical talents for cloud computing industry.

Keywords: Higher vocational education; Cloud computing; Shell programming; Teaching method; Practical teaching

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1. Introduction

With the rapid development of information technology, cloud computing, as a new computing model, has become an important force to promote the innovation and development of information technology industry. In this context, the demand for cloud computing professionals is growing daily, which poses new challenges to the education of computer-related majors in higher vocational colleges [1]. Shell programming, as one of the indispensable skills in the cloud computing environment, is of great significance for students to master the operation and maintenance management of the cloud computing platform and automatic deployment [2]. In the cloud computing professional education, Shell programming teaching is not only a key link to improve students'

practical ability but also an important means to cultivate students' ability to solve practical problems. However, there are several issues in Shell programming teaching at vocational colleges, including a disconnect between the curriculum and actual industry demands, a reliance on a single teaching method, and a lack of emphasis on practical experience. These problems significantly impact both the effectiveness of teaching and the employment prospects of students. Therefore, research and exploration of effective Shell programming teaching methods and practical strategies are of great practical significance for improving the teaching quality of cloud computing major in higher vocational colleges and cultivating high-quality technical and skilled personnel who meet the needs of the industry.

2. The role of Shell programming in cloud computing

Shell programming plays a crucial role in cloud computing, which greatly improves the efficiency, stability, and security of the cloud computing environment by automating key functions such as deployment, system monitoring, log management, data backup, task scheduling, resource optimization, integrated development, security management, and cross-platform operation while helping to reduce operating costs. The flexibility and power of Shell programming make it one of the must-have skills for cloud computing professionals. By mastering Shell programming, professionals can manage and optimize cloud computing resources more effectively, improve work efficiency, and ensure the stability and security of the system, so the course of Shell programming is crucial in the training of cloud computing professionals.

3. Teaching status quo

3.1. Investigation of teaching status

At present, there are some challenges in the teaching status of cloud computing courses in higher vocational colleges [3]. First of all, the goal setting of talent training is not clear enough and there is a disconnect between it and the actual needs of society. Some colleges and universities have not yet formed an education goal system closely connected with market demand, resulting in the difficulty of training students to meet the actual needs of enterprises. Additionally, the teaching content is often outdated and does not keep up with current trends. In some higher vocational colleges, the curriculum and course materials have not been updated promptly to incorporate the latest technological advancements and industry applications [4]. The practical teaching components are relatively weak, with insufficient emphasis on cultivating students' practical experience and innovative abilities. Some higher vocational colleges face limitations in practical teaching resources, as well as inadequate experimental and hands-on training facilities [5].

3.2. Analysis of students' learning difficulties

The difficulties students face when learning Shell programming in a cloud computing course include understanding the complexity and abstractness of cloud computing platforms and how to concretize abstract concepts. Students need to gradually uncover the logic and technical details behind the cloud platform through intuitive case studies and interactive learning. In addition, students may lack sufficient computer science foundation and programming skills, which requires instructional design to build on this foundation to deepen and broaden the boundaries of students' knowledge.

3.3. Analysis of teaching resources and environment

In terms of teaching resources and environment, higher vocational colleges are gradually making use of the advantages of cloud computing to build a massive resource library with rich types and various forms, to promote teaching reform and balance educational resources [6]. However, the application scope of teaching resources is small, the utilization rate is low and there is a phenomenon that construction is more important than application. In a cloud computing environment, higher vocational colleges can leverage robust mechanisms and systems to support the construction and application of teaching resources tailored to each course. This approach can effectively enhance all stages of the learning process, including preparation before class, implementation during class, internalization after class, and course assessment. In addition, the integration model of teaching resources based on cloud computing can effectively eliminate data barriers and realize the efficient and shared utilization of teaching resources [7].

4. Shell programming teaching methods and practical strategies

4.1. Innovation of teaching methods

Theoretical explanation is the basis of teaching, through the systematic introduction of cloud computing and Shell programming theoretical knowledge, to lay a solid foundation for students. Teachers should adopt interactive teaching and encourage students to ask questions and participate in discussions in order to improve the classroom interaction and student participation. At the same time, online platforms and multimedia resources, such as "Detailed Explanation of Linux Shell Command Line and Script Programming Examples", can be used to enrich the teaching content and enhance students' learning interest.

Case analysis is an effective way to improve students' understanding and application ability. By analyzing specific cloud computing and Shell programming cases, students can better understand the application of theoretical knowledge in practice [8]. For example, automated deployment cases of cloud computing platforms can be analyzed so that students can understand the application of Shell scripts in practical work. Project practice is the key to improving students' hands-on ability. By designing and implementing projects related to cloud computing, students can apply what they have learned to practical problems. Project practice can include cloud platform construction, image construction, cloud host construction, etc., so that students can master Shell programming skills in actual operation [9].

4.2. Design of practical links

Cloud platform construction is an important practical link in the cloud computing course. Students can learn the basic concepts, architecture, and key technologies of cloud computing by building a cloud platform. Teachers can design related experiments and practical training projects so that students can master the construction and management of cloud platforms in practical operation. Image building is a commonly used technique in cloud computing and students can deepen their understanding of cloud computing by learning how to build and manage virtual machine images [10]. Teachers can provide relevant experimental guidance and resources to help students master the skills of image building. Cloud host-building application is an important part of cloud computing practice teaching. Students can learn the practical application of cloud computing by building and managing cloud host. Teachers can design related projects and tasks so that students can master the construction and management of cloud host in practical operation.

4.3. Optimization of teaching resources and environment

The optimization of teaching resources and environment is crucial to improve the quality of teaching. Higher vocational colleges can make use of online education platform, virtual simulation experiment, and other modern teaching means to enhance the flexibility and practicality of learning [11]. At the same time, they should strengthen the construction of teachers, improve their professional quality and teaching ability, and ensure that teachers can master the latest teaching methods and industry knowledge.

5. Cooperate with schools and enterprises in teaching reform

Following the principles of learning, educators should guide students to actively construct meaning by focusing on core concepts and designing tasks that reflect digital empowerment, encouraging students to engage in meaningful, hands-on learning experiences. This includes creating situations close to students' real-life experiences, designing challenging learning tasks around real problems that point to higher order thinking, and applying task implementation paths that conform to learning rules with the help of digital technology. Through full interaction, students are encouraged to be highly engaged and deeply involved in the teaching process, which promotes the development of students' higher-order thinking, teamwork and social-emotional abilities. Digital technology is used to expand the advantages of time and space, create a learning space to promote online communication, and enrich ways of cooperative learning. We will align with the latest professional standards, industry standards and job specifications, update curriculum content, and deepen curriculum reform. We will promote project-based, case-based, situational and process-oriented teaching, and make extensive use of heuristic, inquiry-based, discussion-oriented, and participatory teaching to fully stimulate students' interest and enthusiasm in learning.

Questioning activities are integrated into the teaching process, allowing students to identify problems, ask questions, and solve them through various methods. This approach encourages students to experience the joy of discovery, fostering their ability to independently raise questions and find solutions. According to the content of the textbook and the actual situation of the students, the scientific selection of teaching methods and good use of colorful classroom activities, such as telling stories, playing games, etc., can be used to guide students to have a deeper understanding and perception of the text. Let the students play and learn in their homework, and even cultivate their innovative ability, such as telling stories to their parents, making up textbook dramas, interviewing, and other practical activities.

Collaborate with enterprises to explore innovative applications of new-generation information technologies, such as cloud computing, big data, the Internet of Things, and artificial intelligence, in areas like online teaching, educational informatization, smart campus development, and educational research [12]. Additionally, explore new training models for teacher development that meet societal needs, leveraging the scientific research cloud of the new generation. Foster continued cooperation with industry enterprises to involve them in every stage of talent training, achieving school-enterprise collaborative education. Schools can also cooperate with enterprises to build teaching resources and practice bases, and jointly create a three-in-one innovation and entrepreneurship ecosystem of "research platform construction, scientific research talent training, and scientific and technological achievements incubation".

6. Evaluation of teaching effect

Evaluate students' mastery of Shell programming knowledge through their assignments, projects, and lab reports. For example, it is possible to check whether students can write effective Shell scripts and whether they can understand and apply Shell commands and scripts in a cloud computing environment [13]. Evaluate students' ability to actually operate on the cloud computing platform, such as cloud platform building, image building and cloud host building applications. This can be done through practical operations in the lab, simulation experiments, or actual cloud computing projects. Use questionnaires, oral feedback, or an online evaluation system to gather student feedback on course content, teaching methods, and the way the instructor teaches. This feedback can help teachers understand the needs and preferences of students so that they can adjust their teaching strategies [14]. Teachers can conduct self-assessments based on their own teaching plans and students' learning progress. This includes assessing whether their own teaching methods are effective and whether they need to adjust the content and methods based on student learning. Evaluate teaching effectiveness by looking at how engaged students are in class, such as questions, discussions, and teamwork. High engagement usually means that students are interested in the content of the lesson and are able to actively participate in the learning process. Tracking students over time to assess their career development and application of skills after the course can help to understand the impact of teaching effectiveness on the student's future [15].

7. Conclusions

Research shows that the teaching method combining theoretical explanation, case analysis, and project practice can significantly improve students' understanding and application ability. This diversified teaching method helps students combine theoretical knowledge with practical practice and improve their ability to solve practical problems. Practical links, such as cloud platform building, image building and cloud host building applications, are crucial for students to master Shell programming skills. Through practical operation, students can better understand the working principle of cloud computing and the practical application of Shell programming. The optimization of teaching resources and environment has a significant impact on improving teaching quality. The use of modern teaching means such as online education platform and virtual simulation experiment can enhance the flexibility and practicality of learning. The school-enterprise cooperation model is very effective in strengthening students' practical skills. Through cooperation with enterprises, students are able to learn and apply cloud computing and Shell programming skills in a real working environment. Through these conclusions and suggestions, higher vocational colleges can further improve the teaching quality of cloud computing courses, stimulate students' interest in learning, and lay a solid foundation for their future career development.

Disclosure statement

The authors declare no conflict of interest.

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