International Education Forum, 2024, Volume 2, Issue 11
http://ojs.bbwpublisher.com/index.php/IEF
Online ISSN: 2981-8605

Building Cloud Skills: Teaching Innovation and Practice of Automated Operation and Maintenance Courses for Cloud Computing Majors in Higher Vocational Colleges

Jing Zhang*, Qian Zhou

Shandong Labor Vocational and Technical College, Jinan 250300, China

***Corresponding author:** Jing Zhang, zhangjing123551@163.com

Abstract: In the rapid development of cloud computing technology, automated operation and maintenance as its core support is crucial to ensure the efficient and stable operation of cloud services. Given this, higher vocational education must pay attention to the training of automated operation and maintenance skills in the curriculum setting of cloud computing majors. Aiming at the problems existing in automated operation and maintenance teaching in higher vocational colleges, this paper puts forward a series of innovative teaching methods to improve students' mastery of automated operation and maintenance technology. This paper first analyzes the development trend of cloud computing and automated operation and maintenance technology, clarifies the necessity for vocational students to master automated operation and maintenance skills, and then introduces innovative teaching strategies including case-driven, project-oriented, flipped classroom, virtual simulation experiment, and school-enterprise cooperation in detail. These methods aim to improve the interaction of teaching and students' practical operation ability through the close combination of practice and theory. Finally, this paper proposes a mechanism to evaluate and feedback on these innovative teaching methods to ensure continuous improvement and optimization of teaching activities. Through the implementation of these innovative teaching methods, it can be expected that students will better adapt to the technical requirements of the cloud computing era and lay a solid foundation for their future careers.

Keywords: Cloud computing; Automated operation and maintenance; Teaching method; Higher vocational education

Online publication: December 23, 2024

1. Introduction

With the rapid development of information technology, cloud computing technology has penetrated every corner of society, and the innovation of its service model and the expansion of its application field have

brought revolutionary changes to all walks of life. In this context, as one of the core technologies of cloud computing, the importance of automated operation and maintenance technology has become increasingly prominent. It is not only related to the efficient management and optimal configuration of cloud computing resources but also a key factor in ensuring the stability and reliability of cloud services. However, the rapid development of this technology has also put forward new challenges to the talent training of higher vocational colleges [1].

Currently, in the cloud computing education of higher vocational colleges, how to closely combine the teaching of automated operation and maintenance with the needs of the industry, and how to improve students' practical ability and innovation ability have become an urgent problem for educators to solve. Therefore, it is of great significance to explore effective teaching methods and build a course system synchronized with the development of the industry for training high-quality technical and skilled talents to meet the future market demand.

2. Analysis of the current teaching situation

At the moment, higher vocational colleges generally face a series of challenges in the teaching practice of automated operation and maintenance courses. Firstly, the disconnection between the teaching content and the actual needs of enterprises is particularly prominent. With the rapid development of cloud computing technology, the skill requirements of enterprises for automated operation and maintenance talents are constantly changing, and the traditional teaching content is often difficult to keep up with the pace of change, resulting in a gap between what students learn and what enterprises need [2].

Secondly, the lack of an effective practical teaching platform is another significant problem. There are many technologies and tools involved in automated operation and maintenance, and many higher vocational colleges are limited by resources and conditions, and it is difficult to provide students with sufficient practical opportunities and simulate the real operation and maintenance environment.

Finally, the unitary teaching method and the lack of innovation are also important factors restricting the quality of teaching. In such a highly dynamic and practical field as automated operations and maintenance, there is an urgent need to introduce more interactive, flexible, and practice-oriented teaching models.

3. Exploration of innovative teaching methods

3.1. Project-driven teaching method

Teachers should first design a series of challenging project tasks according to the curriculum objectives and enterprise needs, which may include the construction of a cloud platform, the writing of automation scripts, the configuration of a monitoring system, fault diagnosis and recovery, and many more. Under the guidance of the teacher, students participate in the whole life cycle management of the project in the form of team cooperation. From demand analysis, scheme design, implementation, and deployment to test optimization, students need to operate each step by themselves and experience all aspects of automated operation and maintenance [3].

Project-driven teaching method also helps teachers to understand students' practical operation ability and adjust teaching strategies in time to better meet students' learning needs and career development. Through regular project reviews and feedback, teachers can ensure that the teaching content is practical and forward-

looking, while students are also able to enhance their self-confidence and clear the direction of future career development through the presentation of project results [4]. Through this teaching method, students can not only combine theoretical knowledge with practical operation but also learn comprehensive professional abilities such as teamwork, communication and coordination, and problem-solving during project practice. Simultaneously, project-driven teaching methods also encourage students to actively explore and innovate, and stimulate their learning enthusiasm and innovative thinking by solving practical problems [5].

3.2. Case analysis method

Teachers need to be prepared with representative automated operation and maintenance cases, which can be actual enterprise operation and maintenance scenarios or simulated operation and maintenance events. For example, by analyzing cases of log anomaly detection and automated response, students can learn how to build a log analysis system using Python and machine learning libraries to realize automatic monitoring of server logs and rapid response to abnormal behaviors. In the teaching process, teachers can guide students to analyze from multiple dimensions such as case background, problem definition, solution design, implementation process, and result evaluation [6]. In the teaching of cloud computing majors, case analysis can help students combine theoretical knowledge with practical operations and enhance their ability to solve practical problems.

3.3. Virtual simulation experiment

A virtual simulation experiment is an efficient teaching means. It simulates the real cloud computing environment so that students can learn and practice automated operation and maintenance without physical resource constraints [7]. Teachers can pre-build the experiment environment on the cloud platform, including virtual machines, network configuration, storage resources, and the like. Students can log in to the environment directly and start the experiment operation. This saves students time in configuring the environment and allows them to focus on learning and practicing operations technology.

Through students' lab operations, lab reports, and online discussions, teachers can assess students' mastery of automated operations technology. Concurrently, teachers can constantly optimize experiment content and teaching methods based on students' feedback. The virtual simulation experiment of the cloud platform can not only improve teaching efficiency but also stimulate students' learning interest and cultivate their practical ability and innovative thinking [8]. This teaching method has important application value for the automatic operation and maintenance course of cloud computing majors in higher vocational colleges.

3.4. School-enterprise cooperation

In the automated operation and maintenance courses of cloud computing majors, cooperating with enterprises to develop courses and provide practical training opportunities is an effective teaching method. This mode of cooperation can ensure that the teaching content is closely connected with the actual needs of enterprises while providing students with a real working environment and enhancing practical combat experience [9]. Schools can work with companies to develop curricula and ensure that the content reflects the latest trends and technologies in the current industry. Companies can provide practical cases and projects for students to learn and practice in the curriculum. This collaboration helps students understand the actual needs of the business and learn the most relevant skills.

Through cooperation with enterprises, schools can provide internship opportunities for students, enabling students to participate in practical operations and maintenance projects in enterprises. This hands-on experience is crucial for students' career development as it helps them understand the real-world application of classroom knowledge and improve their vocational skills. Students who participate in enterprise programs can gain a better understanding of career paths in the field of automated operations, which can be very helpful in their career planning. Teachers can also enhance their professional skills and industry knowledge through cooperation with enterprises, thus improving the quality of teaching.

Through this cooperative model, students can not only gain theoretical knowledge but also improve their skills and competitiveness through practical learning, preparing them for their future careers [10].

4. Teaching methods implementation strategies

4.1. Docking of course content with enterprise needs

Regular communication between professional teachers and businesses is essential to keep educational content current and relevant. Through direct dialogue with industry experts, teachers can stay up to date on the latest technology trends, tools, and best practices, as well as the latest needs of businesses for talent. This close school-enterprise collaboration ensures continuous updating of course content, enabling the education to respond quickly to industry changes, thus producing graduates that meet current market needs.

4.2. Build a practical teaching platform

Schools should establish cloud computing automated operation and maintenance laboratories, equipped with corresponding hardware and software facilities, to provide students with a good practice environment [11]. The practical teaching platform should aim to provide a real, dynamic learning environment closely linked to the industry so that students can learn and apply automated operation and maintenance technology in real projects. The platform should integrate key technologies in the current field of cloud computing and automated operations, such as virtualization technology, cloud platform management, and container technology, to name a few, to ensure that students have access to the technologies currently used by the industry [12]. Through such a practical teaching platform, students will not only be able to improve their technical skills, but also enhance soft skills such as teamwork, problem-solving, and project management, preparing them for their future careers [13].

4.3. Application of diversified teaching methods

Combine project-driven, case analysis, flipped classroom, and other teaching methods to improve the interest and effectiveness of teaching. For example, the use of project-driven design has practical application value for the project, so that students can learn and apply automated operation and maintenance technology in the process of project implementation. The project can involve cloud platform construction, automated script writing, system monitoring and maintenance, and so forth, encouraging students to play different roles in the project and experience teamwork and project management. The use of flipped classrooms increases the interest of the class, such as requiring students to independently learn basic knowledge by reading materials and watching videos or online courses before class [14].

Class time is used for in-depth discussions, solving doubts, doing hands-on work, and applying what has been learned. Teachers act as mentors and facilitators rather than mere transmitters of knowledge.

Stimulate students' interest in learning through gamified learning elements such as point systems, contests, and challenging tasks. Design interactive sessions such as group discussions, role plays, and simulation drills to add interest to the class. Through this diversified teaching method, students can not only learn the skills of automated operation and maintenance in practice but also improve their learning motivation and engagement, while teachers can evaluate and enhance teaching effectiveness more effectively.

5. Add career guidance to the teaching process

Professional teachers should implement career guidance as a very important part of their curriculum [15]. Only when students know what they can do in the future with their learning skills, their motivation and interest in learning will increase. Teachers should pay attention to the latest developments in cloud computing and automated operations, including technology trends, industry reports, and market needs, to provide students with the most cutting-edge information. Teachers should pay attention to the latest developments in cloud computing and automated operations, including technology trends, industry reports, and market demands, to provide cutting-edge information to students and emphasize to students the core skills of automated operations.

For example, scripting (Python, Shell), use of automation tools (Ansible, Chef, Puppet), container technology (Docker, Kubernetes), and operation and management of cloud computing platforms (AWS, Azure, Google Cloud, Alibaba Cloud). Teachers should also help students understand the career development path of cloud computing automation operation and maintenance engineers, including technical experts, team leaders, project managers, and other different directions, suggest students attend industry conferences, seminars, and training, join professional communities, build connections with peers, understand industry dynamics, encourage students to gain practical experience through internships and practical training projects or participation in open source projects. This will help them demonstrate their practical workability when applying for jobs.

6. Conclusion

In the automatic operation and maintenance course of cloud computing major in higher vocational colleges, the reform of teaching methods is the key to improving the quality of education and the competitiveness of students in employment. To train high-quality technical talents who can adapt to the development of the industry, the teaching reform must be closely combined with the latest needs of the industry to ensure the real-time update and practicality of the course content. Through intensive practical teaching, students can apply what they have learned in a real working environment and improve their ability to solve practical problems. Moreover, adopting diversified teaching methods, such as project-driven, case analysis, and flipped classrooms can stimulate students' interest in learning and promote the development of their critical thinking and innovative abilities. Furthermore, effective career planning guidance is crucial for students' long-term development. Teachers should provide guidance on career development paths, help students understand industry trends, and job demands, and make personal career plans. This will not only help students to study purposefully while in school, but also lay a solid foundation for their future careers. Through these comprehensive teaching strategies, higher vocational colleges can cultivate talents with deep professional knowledge, good career skills, and clear career plans to meet the needs of talents in the field of

cloud computing automated operation and maintenance.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Jia L, 2024, Research on Training of Cloud Computing Professionals in Higher Vocational Colleges under the Background of Informatization. China Information Industry, 2024(03): 176–178.

[2] Cao Z, Lang Z, 2022, Research on Talent Training Model for "Craftsman Workshop"—Taking Cloud Computing Technology Application Major as an Example. Journal of Tianjin Vocational Colleges and Universities, 24(09): 59–63.

[3] Wang P, Gao G, 2024, Research on Project-Driven Computer Vision Teaching Reform. Journal of Science and Education, 2024(19): 95–98.

[4] Pu Q, Wang H, 2019, Experimental Teaching Design of Linux Programming Based on Project Driven Approach. Computer Knowledge and Technology, 20(24): 152–154.

[5] Wang D, 2005, Research on Project-Based Teaching Method in Computer Course Teaching. Vocational Education Research, 2(9): 74–75.

[6] Ning N, 2023, Application of Case Analysis Method in the Teaching of Advanced Financial Management. Fulcrum, 2023(08): 153–154.

[7] Liu C, Tan K, Zhang L, et al., 2024, Research on Virtual Simulation Experiment Teaching of Cloud Computing and Automated Operation and Maintenance Course Group. Computer and Telecommunications, 2024(3): 17–20.

[8] Wang G, Luo Y, Lin Y, et al., 2023, Research on Virtual Simulation Experiment Teaching Platform based on Internet of Things Technology. Internet of Things Technology, 13(07): 155–156 + 159.

[9] Ding J, Tong W, 2008, Reunderstanding of "School-Enterprise Cooperation and Work-Study Combination" in Higher Vocational Education. Higher Education Research, 2008(06): 49–55.

[10] Luo Y, 2024, School-Enterprise Collaborative Innovation, Promoting the Integration of Production and Education. Science and Technology Daily, published August 14, 2024, (005).

[11] Liu Y, 2024, Research on the Construction of Network Security Experiment Teaching Platform Based on Cloud Computing and Virtualization. Foreign Trade and Economics, 2024(07): 89–92.

[12] Jin H, 2023, Construction of Online Open Experimental Training Platform for Cloud Computing Courses. Fujian Computer, 39(10): 57–60.

[13] Li B, Cui L, 2022, Construction and Application Research of Economics and Management Experiment Teaching Platform Based on Cloud Computing. Teachers, 2022(28): 81–83.

[14] Zhao X, 2014, Knowledge Internalization Process and Teaching Model Design in Flipped Classroom. Modern Distance Education Research, 2014(2): 55–61.

[15] Liu C, Wang J, Miao L, et al., 2022, Research on Course Group Construction of "Cloud Computing and Automated Operation and Maintenance" Based on Job Skills. Wireless Internet Technology, 19(04): 150–152.