Teaching Reform of Java Program Design Based on Vocational Education Cloud Platform

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Abstract: This article discusses the teaching reform of the "Java Programming" course. With the rapid development of online teaching platforms and the practical needs of computer major education, this article aims to explore and reform the "Java Programming" course in light of the current Internet era. A "online + offline" hybrid teaching model is proposed, which is implemented on the Vocational Education Cloud platform. First, the content of the "Java Programming" course is designed to be tailored to the "online + offline" hybrid teaching model. Then, the hybrid teaching process is carried out, relying on the Vocational Education Cloud platform, which is divided into three stages: pre-class, in-class, and post-class. Finally, for course assessment and evaluation, the Vocational Education Cloud platform is utilized.

Keywords: Java Programming; Teaching Reform; Vocational Education Cloud Platform; Hybrid Teaching Mode

1. Introduction

In recent years, online education has been flourishing, and the blended learning model combining online and offline teaching has been increasingly favored by teachers. This model not only allows teachers to play a leading role in guiding and supervising the teaching process but also fully mobilizes students' initiative, enthusiasm, and creativity in the learning process [1].

"Java Programming" is a core course in higher vocational computer network technology majors. This course covers a wide range of knowledge points, with heavy practical tasks and relatively few class hours, which is an important reason for implementing the "online + offline" blended teaching. Students can utilize fragmented time to complete online learning tasks, while teachers can provide in-depth explanations tailored to students' weak knowledge points based on their online learning progress. Combining traditional face-to-face teaching with online learning in a blended teaching model can better stimulate students' interest in learning, cultivate their ability for independent exploration and innovation, and effectively enhance the quality of course teaching [2].

2. Challenges and Dilemmas in Java Teaching

Java, as a widely used programming language in enterprise application development, has become an indispensable part of computer professional education. However, in the Java teaching process, there are still many problems and challenges.

2.1 Limited Class Hours, Abundant Content

The teaching of the Java course is divided into theoretical and practical parts, but the total number of class hours is limited, and time constraints result in relatively less time for both theoretical and practical learning. In addition, students are confined to theoretical knowledge from textbooks during theoretical learning, and practical learning usually only involves simply implementing the programming exercises from the course materials. It is challenging to cultivate students' autonomy in exploring and innovating in the software design process, to motivate students' enthusiasm for learning, and to keep pace with the times. This teaching method easily leads to students feeling fatigued and disinterested, while also resulting in poor digestion and absorption of knowledge. Therefore, the current Java programming teaching faces some challenges in effectively integrating theoretical knowledge with practical application [3,4].

2.2 Vocational College Student Demographics and Learning Situation In recent years, with the continuous expansion

of higher vocational colleges and the diversification of student sources, it is generally observed that students tend to have general cultural foundations in weak knowledge. They often lack interest in and do not prioritize the learning of theoretical knowledge. However, they demonstrate strong practical and hands-on abilities. Many students have insufficient self-motivation, have not developed good self-management habits, lack the ability to control their own study and life time, and find it difficult to keep up with more systematic and in-depth knowledge learning [5]. Their mental health conditions are not optimal, as they face various new issues in their adolescent lives, relationships, and social interactions during a stage of immature development. psychological Thev mav experience emotional fluctuations, anxiety, confusion, tension, and avoidance due to their challenging academic experiences, the complexities of youth life, relationships, social interactions, the rapidly changing society, and intense competition. In addition to fostering a positive learning atmosphere, implementing strict educational management, and enhancing mental health education, curriculum reform is also crucial [6].

With the expansion of higher vocational colleges, the sources of students have become diversified. The more sources for computer-related majors mainly include "2+3" students from vocational schools, students from five-year programs, associate degree students who participated in the national general high school entrance examination, individual enrollment students from regular high schools, and expanded enrollment students. Due to the diversity of student sources, the quality of students also varies. Some students have weak fundamental knowledge. lack interest in theoretical knowledge, but excel in practical skills; while some students have not developed good study habits, lacking the habit of previewing, studying during class, and reviewing after class, and only rely on teachers' lectures in class, making it difficult to grasp the knowledge within the limited classroom time. If students do not preview the lessons before class and are unfamiliar with the content to be taught by the teacher, as the course difficulty increases, they will not be able to keep up with the teacher's pace, leading to difficulties in

understanding during class and after class, thereby affecting their professional technical abilities and subsequently impacting their employability competitiveness [7,8].

In conclusion, Java education is facing many challenges and dilemmas. In order to effectively address these issues, innovative educational methods and strategies need to be adopted. This includes enhancing practical updating teaching materials. training. designing diversified courses, guiding students think independently, and promoting to interactive communication. Only in this way can the quality and effectiveness of Java education be improved, and more outstanding Java programmers with practical application be cultivated. skills The proposed improvement measures are as follows:

3. Hybrid Teaching Reform Measures

3.1 Developing Online Teaching Resources

Online teaching resources refer to educational materials provided through online platforms, PowerPoint including teaching slides. instructional videos, course and case studies, assignments, exam question banks, etc. Online teaching resources should form а comprehensive knowledge system for the course, enabling students to achieve the objectives through learning self-study. Furthermore, in line with the concept of hybrid teaching reform, online teaching resources should also stimulate students' initiative in learning, with content that is clear and concise for pre-class preview, knowledge refinement for post-class consolidation, and a concise and interconnected format that facilitates fragmented learning [9].

3.2 Organizing Hybrid Classroom Teaching Activities

3.2.1 Pre-class student study

Pre-class student learning refers to active online learning that students can engage in using online teaching resources based on learning tasks assigned by teachers. This model places the core content of teaching on online and student self-learning. The advantage is that it can cater to the varying foundations of students, each person can adjust their learning plan proactively based on their own circumstances, repeat learning multiple times until they have a basic mastery of the teaching content. Pre-class learning should include attendance check-ins, messages, and some question-and-answer and interactive segments to act as supervision, and to promptly collect significant and difficult issues encountered by students during learning, which is beneficial for teachers to grasp students' learning progress and situations in a timely manner, and helps teachers have a targeted arrangement of teaching content in subsequent classroom teaching to increase teaching efficiency [10].

3.2.2 Teacher-student classroom activities

In blended learning activities, the connotation of classroom teaching will undergo significant changes. Since the basic teaching content has been required to be completed by students before class, the main content of classroom learning should focus on answering questions, showcasing achievements, and providing innovative guidance. Evaluation of pre-class learning: Teachers should give feedback on students' learning, pre-class including attendance, assignments, messages, etc., based on online teaching resources. They should report on students' completion status, set clear rewards and penalties, and gradually guide students to improve their enthusiasm for pre-class learning. Teachers should based on the feedback from pre-class learning, teach key knowledge points. Teachers should assign experimental learning and discussion topics, and through brainstorming, group discussions, achievement presentations, etc., achieve interactive classrooms to engage students, arouse their enthusiasm for learning, and stimulate their initiative and innovative thinking.

Taking the knowledge point of "inheritance" as an example, first, the teacher reviews the content of the previous class and introduces the current topic of "inheritance" based on the self-study situation of online students. At the same time, the learning objectives of this class are clarified: to understand the definition and usage of inheritance; to be able to independently complete the source code writing, compilation, and execution of "student class inheritance". Next, the teacher focuses on explaining key knowledge points: the definition and implementation of inheritance, and explains the implementation ideas of student class inheritance with real case examples. Finally, the teacher summarizes the

knowledge points explained in the class, and then students engage in in-class exercises and presentations.

3.2.3 Post-class phase

In the post-class stage, the teacher implements expansion through online methods in two steps: Firstly, the teacher publishes expansion tasks through the vocational education cloud platform. Students complete the expansion tasks individually or in small groups and upload them to the vocational education cloud platform. Secondly, the teacher can evaluate the assignments submitted by students, and at the same time, groups can also engage in peer evaluation and self-evaluation.

3.2.4 Multi-dimensional assessment criteria

Multi-dimensional assessment can be fully utilized through the vocational education cloud platform, keeping up with the times in the process-based teaching results assessment, and incorporating the flexible assessment concept tailored to individual students. The main assessment dimensions include students' diligence, course participation, test results, and experiment scores. In online teaching, students' self-learning frequency, assignment completion rate, chapter quizzes, etc., are assessed on the vocational education cloud platform; in classroom teaching, students' attendance, activity participation, experiment reports, etc., are evaluated. Both parts can be incorporated into the final assessment score based on certain weight ratios.

3.3 Blended Learning Effectiveness

By utilizing the data statistical function of the vocational education cloud platform, it is evident from the students' performance over the past three years that the teaching effectiveness has significantly improved, with the annual achievement rate of teaching objectives on the rise. The teaching design is reasonable and aligned with the expected goals. Student attendance, participation, classroom satisfaction, and task completion rate have been increasing annually, with the exam pass rate reaching 96.14%.

Through statistical analysis, it was found that: 1. Blended learning emphasizes the management of students' learning process, which can effectively enhance students' enthusiasm for self-directed learning; 2. The content of assignments and chapter quizzes is closely related to the teaching materials, with flexible management, convenient supervision, diverse channels for teacher-student communication and answering questions, resulting in good student mastery of knowledge. The completion rate and accuracy of assignments and chapter quizzes are both highly guaranteed; 3. The high pass rate in the end-of-term exams confirms the excellent teaching outcomes of blended learning.

4. Conclusion

After the reform of the blended teaching model based on the Vocational Education Cloud for the "Java Programming" course, the emphasis in teaching management is on using the learning process as the teaching focus. In of teaching content, continuous terms improvement is achieved through interactive exchanges between teachers and students to facilitate student understanding and learning. Regarding teaching methods, the emphasis is on enhancing student autonomy through a combination of online self-study and offline interactions. After several academic terms of practice, this course has seen continuous enrichment of course resources and improvement in the mechanism for teacher-student communication. It has demonstrated significant teaching outcomes, not only in assisting students in completing the course but also in providing support for their subsequent study of Java-related courses. Additionally, it has greatly enhanced students' ability for self-directed learning.

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