Exploration and practice of cloud computing course reform in the environment of Aliyun + MOOC

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ABSTRACT

The teaching theory is disjointed from social needs in the computer professional courses. To solve this problem, we propose a new model that incorporates the Aliyun platform and large-scale open online course system. MOOC are a useful addition to theoretical teaching. The Aliyun platform has experimental teaching with real cases, which alleviates the environment configuration of students and increases their interest in learning. After a year of operation, there has been a significant increase in student experimentation. Statistical results show that the students' final exam scores increased by 12.50% and their operational scores by 14.80%. The proposed model is more suitable for modern computer teaching in cloud environments.

Keywords: Aliyun, MOOC, cloud computing, computer courses reform

1. INTRODUCTION

Under the severe situation of today's information society, college students' computer knowledge and application ability are required to be greatly improved. The course teaching for computer majors needs innovation and reform. Nowadays, computers are one of the three major means of advancing human civilization, the other two are science and technology. Therefore, computer skills are an important part of college students' development[1].

The current computer courses teaching has a serious problem of disconnection between teaching theory and social needs, which makes current teaching in a difficult situation. These courses should not only focus on cultivating students' computer knowledge system and skills, but also on cultivating students' ability to use computers to solve practical problems. Computer courses should develop students' understanding of computing, just as mathematics and physics education develop students' understanding of the general knowledge of the subject. Considering the importance of computer to society, constructing a new computer teaching model has become the primary task of teaching reform in Colleges and universities. Therefore, it is the general trend to adopt new methods and technologies.

Massive open online courses (MOOC) have introduced a new approach to online education that has generated great interest in higher education[2]. Under the influence of the current epidemic, online courses have become a necessary choice for universities. Therefore, more and more schools introduce MOOC into teaching process. These strategies not only reform the curriculum, but also improve the teaching quality. The university computer course has changed the nature of teaching, and the combination with classroom teaching has brought new opportunities for the deeper reform.

Cloud teaching environment is a new technology that supports the development of education in the information age. Cloud computing and multimedia technology provide a broader virtual space for sharing educational resources and provide strong technical support for the sustainable development of MOOC[3]. The classroom and enterprise level applications are combined through the Ministry of Education's Industry-University-Research Cooperation Program. What students learn in class is no longer boring book knowledge, but real projects. This has achieved the combination of theory and practice. In its industry university cooperation plan, Aliyun provides free computing power for college teachers, so that teachers and students can not only develop their own online teaching environment, but also reasonably use the teaching environment deployed on Aliyun platform[4]. This brings two benefits. First, it has a stable and smooth teaching environment and can interact with professional and technical personnel in real time. Second, it enables teachers and students to experience the efficient and convenient learning environment brought by the cloud environment.

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2. TRADITIONAL TEACHING AND MOOC

Traditional teaching is still the main model of instruction in universities. In this model, the first step is to prepare the course material. Then, the teacher passes on the content to the students. And then, students complete the exercises after class. Finally, the testing of student learning by taking a final exam. Test results are the main test indicators of students' learning and the pillar of students' assessment. This kind of Teacher centered teaching is a traditional teaching form, which is still the main teaching mode in many universities.

In recent years, the government has issued many educational policies, most of which encourage universities to broaden their horizons. Many teachers have also realized many disadvantages of the traditional teaching mode like old teaching content and single teaching method. Compared with MOOC, most of the computer courses can involve practical teaching. This creates students' favorable conditions to internalize computer knowledge and develop computer ability.

The design of practical teaching content should encourage students' innovative thinking. When solving problems, we should emphasize the diversity of methods to solve problems. Different problem-solving methods use different structures to solve a series of problems, which has a great stimulating effect on students to improve their thinking structure.

Classroom teaching should focus on providing rich and multi-level practical training and guidance in addition to basic knowledge. MOOC break the boundary between organizational theory and practice of classroom teaching and form a harmonious entirety. The teaching place can be a practical classroom, where teachers and students teach and learn together.

3. MOOC DEFINED COURSES

In the MOOC environment, courses are defined by MOOC. Classroom teaching will focus on students and learning. Teachers are leaders of guidance and control, emphasizing interactive teaching. The teaching process is problem based and students are encouraged to discuss and ask questions in the process of solving problems. MOOC provide instructional content that allows teachers to spend more time with students. MOOC provide students with the opportunity and conditions to ask questions and explore answers in class.

In terms of teacher-student interaction, teachers can better guide students to work in groups and form a diversified collective. This is good for the development of every member of the team. As part of this deeper interaction, teachers need to provide tools to solve teamwork problems and correct student errors, while focusing on individual differences. This kind of teaching encourages the students' initiative. It enables students to learn actively through cooperation and practice, rather than the previous model of listening or seeing.

3.1 MOOC hybrid teaching and learning

The core value of college computer courses is to cultivate students' computational thinking ability. Scholars have reached a consensus that college computer teaching reform should be guided by inculcating computational thinking[5]. However, to put this consensus into practice, it would take a great deal of effort to develop a complete new system.

At present, most university computer teaching is teacher-centered. Teachers decide what to teach and when to teach it. Teachers focus on describing computers and their applications. The process of knowledge acquisition is particularly valued. Students are passive receivers of knowledge. This learning method includes obedience, memorization, and imitation. Such teaching is not conducive to the development of students. In an ideal teaching model, there should be a high degree of interaction and collaboration between students and teachers.

In the traditional face-to-face teaching, although there is an interactive process between teachers and students, the priority is given to the teacher's unilateral knowledge indoctrination. This will cause students to develop bad study habits in the long term. It's hard to motivate them; If the teacher is not prepared before class, it will lead to the lack of effective two-way interaction. However, with MOOC, teachers can ask students to watch MOOC and PowerPoint courseware as preparation for class.

In the hybrid MOOC, teachers ask questions to check whether students have previewed assignments before class. Incorporate questions into performance reviews to put pressure on students. Teachers can promote students' learning through active discussion, self-directed learning and other ways, and guide students to solve problems encountered in the preparation process. This will transform the one-way knowledge transfer into a targeted teaching process. The combination of online MOOC learning and classroom teaching can realize the ideal of interactive teaching in colleges

and universities. Basic courses are particularly suitable for this kind of teaching, because the introductory nature of the course makes it moderately difficult, and students can learn it through pre-class preview[6].

3.2 Ways of thinking and approaches to solving computer problems

Computational thinking reflects a way of thinking and method needed to solve computer problems. This provides a solid foundation for developing and innovating computer applications. It is easy for students to acquire basic computer knowledge, but it takes a lot of time and training to develop the ability to apply this knowledge effectively. The reformed college computer courses should teach students not only conceptual knowledge, but also the ability to apply knowledge. Therefore, the challenge of computer teaching reform is to inject this new way of thinking as the outcome of the reform curriculum. The reform will cover teaching content and teaching methods, as well as introducing innovative teaching practices.

There are also two external factors that have a negative impact on college computer teaching. The first is to compress class time. The course has theoretical content and covers a wide range of knowledge. The usual practice is to spend most of the teaching time in theory classes and a few hours in practical classes. This lack of practical teaching makes it difficult for students to digest the theoretical knowledge. The second problem is the different levels of students' computer knowledge. The problem that university computer teaching has been facing is that some students know a lot about computers, while others do not know anything at all. This makes it difficult to organize classroom instruction.

The greater demand for computational thinking in the reformed curriculum will make the effects of these individual differences more apparent. Traditional classroom teaching requires students to have a roughly equal amount of computer knowledge beforehand. MOOC can provide solutions to problems caused by individual differences. A new MOOC-oriented teaching model is shown in Table 1.

Table 1. Course design in MOOC and cloud environments.

Learning Process	Teacher	Student	Cloud Environment Tools
Preparation phase	Individual preparation and group preparation	None	Large amount of video and course resources
Pre-course phase	Lesson plan posting, data transfer	Receive data, interact with instructor	Community software, dynamic repository, virtual classroom
Classroom learning phase	Distance learning, lesson plan discussion	User login, remote class	Virtual classroom, e-library, shared notes
In-class learning phase	Assignment correction, class schedule feedback,	Assignment submission, student-teacher interaction	Forum, e-library, shared notes
After-class learning phase	After-class sharing, knowledge development	Independent study, communication and interaction	Instant messaging, e-mail
Evaluation phase	Assignment grades	Results and certification	Individualized evaluation system

4. CLOUD-BASED MOOC FRAMEWORK

The teaching process of massive open online courses is mainly divided into groups, which work together, and resources are accessed through seamless connections. This solves various problems in the traditional teaching model and plays an important role in promoting the new concept of open education[7].

Aliyun teaching environment is a new technology to support the development of education in the information age. Cloud computing and multimedia technology provide a broader virtual space for the sharing of educational resources, and provide strong technical support for the sustainable development of MOOC. Such as learning resources, teaching platforms and tools. It also provides adaptation services for different environments, access modes, and terminals. Each user can be a learner, a teaching resource provider or a course organizer. This strategy is in line with the original intention of the advocates of open learning community.

Aliyun teaching environment platform can support the learning mode and characteristics of most participants. Teaching tools include commonly used virtual classrooms and learning Spaces, websites, blogs, E-mail, electronic libraries, and bulletin board systems (BBS). Cloud and mobile computing technologies enable MOOC to support formal, informal, hybrid and mobile learning models and interactions.

In a MOOC, team learners, teachers, organizers, and experts conduct their daily learning, work, and management activities in a networked environment. With the support of multiple locations and access terminals, MOOC can provide more personalized services that break the constraints of time and space[8]. This allows learners to learn at their own pace while facilitating communication between teachers and students; the cloud environment with shared notes allows real-time interaction between participants and sharing of teaching resources.

MOOC can optimize teaching and learning through a well-designed curriculum and technology teaching platform. Table 2 shows the backend login interface of the teacher of the virtualization and cloud computing course. The teacher releases the experiment through the experiment release page, and each student can start the experiment in the environment provided by Aliyun. At the same time, the teacher can monitor the experimental process of each student.

Table 2. The teacher management interface of Aliyun platform.

Experiment name	Update time	Audit Status	Publish Status	Operation
SLB Load Balancing	2021-11-5	Audit approved	Published	Edit
Docker Experimentation	2021-11-5	Audit approved	Published	Edit
Git Experiment	2021-10-8	Audit approved	Published	Edit
Hadoop pseudo-distribution environment building experiment	2021-10-8	Audit approved	Published	Edit

As can be seen from Table 2, that each program in the cloud teaching environment is achieved by using network multimedia technology. Students and teachers simulate course teaching according to pre-defined course content to achieve the same teaching effect as non online courses. Finally, cloud resources can add expressive content to the course. These technologies have improved learners' enthusiasm and participation in the course.

5. CONCLUSION

This paper proposes a new teaching model, which is student-centered. This model uses the cloud computing platform of foreword and is supported by massive open online courses. The result is to train students' ability of using computers and train their thinking of calculation to solve problems. It is a substantial expansion of traditional teaching methods.

At the same time, this teaching concept meets the requirements of cultivating innovative ability and promoting lifelong learning. Although the online education model represented by MOOC needs further deepening and development, it has played a positive role in promoting the reform of higher education.

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