Research Overview of the Informative Teaching Approach under Cloud Computing Environment

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Abstract. Cloud computing technology plays an important role in informative teaching. Firstly, this paper summarizes the application of cloud computing technology in colleges and universities, then describes the existing teaching approaches in cloud computing environment in detail, finally summarizes the existing problems in the teaching mode and looks forward to the research direction of teaching mode in cloud environment.

Introduction

Many colleges and universities at home and abroad have introduced cloud computing technology into the curriculum teaching and started the project of building education cloud successively since the concept of cloud computing was put forward. In a cloud environment, resource sharing becomes easier. The relatively independent digital resources are reorganized according to the characteristics of resources and the knowledge points of the course by using the digital resource integration technology of cloud computing. It will realize the orderly organization of resources and users can get the digital resource cloud services. The electronic teaching plans, teaching videos, micro-classes are new teaching methods formed by the support of cloud computing technology. The teachers can get more abundant teaching resources and the teaching content has been updated in time by using these information teaching methods. Therefore, it is of great significance to explore and study the universal teaching mode and teaching evaluation mode under the cloud computing model.

The application of cloud computing technology in colleges and universities is first outlined, and then the existing teaching mode is described in detail under cloud environment in this paper. Finally, the existing problems in the teaching mode are summarized and the research direction of teaching mode based on cloud environment is prospected.

The Application of Cloud Computing Technology in College Teaching

Review of Present Condition of Domestic Researches

At present, most colleges and universities have built their own network and data center and purchased some system platforms, software programs, digital resources to promote information teaching. However, the continuous upgrading of information center equipment for schools is not only costly but also difficult to meet the requirements of the rapid development of information teaching system and the diversification of education services [1]. With the wide application of cloud computing technology, the corresponding work of educational institutions' Network Center and data center can be completed by using cloud computing services. Colleges and universities can lease the use right of infrastructure, computing power of the service providers of cloud computing to develop digital resources and implement information teaching [2-4].
In 2008, Professor Li Jiahou first put forward the concepts of cloud computing assisted instruction (CCAI) and cloud computing assisted education "CCBE" at the annual meeting of China Association of educational technology [5]. Cloud computing began to be used in the field of education in China. Google began to establish academic cooperation projects with some universities in China to promote the application of cloud computing technology in the field of education in 2008. In 2009, IBM and Beijing University of Technology jointly established the "cloud computing experimental platform of Beijing University of Technology" to provide high-performance computing resources and services to schools, enterprises, governments and open source communities. From 2014, Nanjing No. 55 Research Institute began to cooperate with vocational colleges to promote the application of cloud computing technology in the campus. The teaching mode based on cloud computing began to be studied after the application of cloud computing technology in colleges and universities.

We searched the CNKI database for relevant articles published in Chinese between January 2009 and December 2019 by using the Keywords of "cloud computing" and "teaching" in terms of teaching mode and teaching evaluation. There are 3439 related documents. These documents are displayed according to the published year, as shown in Figure 1. It can be seen from the figure that the literatures of cloud computing assisted teaching have been growing since 2009. However, there are 24 related documents by using the keywords of "cloud computing" and "blended teaching". There are 300 related documents by using the keywords of "cloud computing" and "teaching mode". There are 23 related literatures by using the keywords of "cloud computing" and "teaching evaluation". There are 33 related literatures by using the keywords of "cloud computing" and "teaching practice". These also show that the research of teaching mode, teaching evaluation and teaching practice based on cloud computing are still intiative.

In these documents, Zheng Min chose Baihui cloud to build an online learning platform [6]. Through the analysis of the advantages and disadvantages of popular education cloud platform, for different users, the author chose SaaS architecture to build the cloud online learning platform; through the analysis of the characteristics of the target and students, the author used the cloud platform to build the learning environment and used the integration and utilization of teaching resources to promote the all-round development of students. The author analyzed the selection of the curriculum and object, the planning model of design and application and applied the model in teaching practice. The application results show that the model can promote the interaction of learners, learning achievement. Zhang Chen et al [7] put forward the reform strategy of university teaching mode under the background of big data and cloud computing. Chen Jia et al. [8] designed a teaching mode of high-quality resource sharing platform based on the cloud computer, in which teachers and students coordinate with each other through the cloud platform to complete curriculum tasks. Wang Fengmei et al. [9] established an engineering graphics private cloud based on cloud computing model to meet the needs of teachers and students. Three-way combination model was explored to combine curriculum design with
learners' problems and online and offline brow-sing resources exchange with problem solving, theory knowledge and practice with the drawing expression. It would provide valuable reference for student-centered teaching, students' autonomous learning and their lifelong learning habits. Su Mingfeng et al. [10] proposed a blended learning model based on cloud computing platform in order to promote the education informationization, solve the difficult problem of the computer network technology professional curriculum teaching. The authors analyzed the characteristics and teaching status of the core curriculum of the computer network interconnection and explored the blended learning of course. The results showed the model proposed added the interesting of students. Liu Huarong [11] designed a blended teaching mode based on vocational education cloud platform which included pre-class learning, learning guide in class and expanding after-school. Liu Haiyan et al [12] proposed a practical research on the blended teaching based on the network platform of the national learning resources repository. The blended teaching design framework based on the national learning resources repository was presented. The practical results showed that the proposed blended teaching model can play the students’ role, improve the quality of teaching. At the same time, the research provided the refer case for the teaching practice in blended teaching model.

In terms of teaching evaluation under cloud computing mode, Su Mingfeng et al. [13] built a blended learning evaluation system based on cloud computing which evaluated students' learning through students' learning process and learning result.

In terms of teaching practice, literature [9-12] applied the proposed teaching mode to specific courses and described the teaching effect. These articles did not promote the proposed teaching mode.

Review of Present Condition of Foreign Researches

The application of cloud computing in the field of education is relatively early in foreign countries. In 2007, IBM and Google applied cloud computing technology to Massachusetts Institute of technology, Yale University, Stanford University, University of California, Duke University and other universities [13-14]. With the development of network technology, Microsoft, Amazon and other industries have created corresponding cloud platforms, which are gradually applied to the profession of education and provide convenient services for teachers and users. In terms of teaching mode, online teaching abroad is very early which provides better services for students in remote areas or students with limited learning time. MOOC teaching is also relatively mature. Stanford University, Harvard University, MIT and so on have developed MOOC teaching. There are more researches on Blended Teaching in foreign countries, most of which are on the design of teaching model and the design of evaluation tools and process models are less.

To sum up, cloud computing technology has been widely used in education and scientific research. This new teaching environment enables teachers and students to access computing, storage, network and teaching documents and other resources on demand, improves the utilization rate of resources, enriches the content of teachers' teaching and expands students' horizons. At the same time, it is more convenient for teaching with the use of various intelligent terminals.

Existing Problems

In the process of applying cloud computing technology, the following problems still exist:

(1) The lack of teaching mode and teaching design in the cloud environment

At present, the teaching methods mainly include "project + task-driving teaching method", "case teaching method", "project-oriented teaching method" and "group discussion method". The teaching method adopted is that the teachers prepare lessons and then explain the course content in the classroom. The main task of the students is "listening". These methods cannot play the subjectivity of the students, arouse the initiative and autonomous learning of the students. However, in the cloud environment, teaching-related resources have been integrated and released on the designated teaching platform to carry out online and offline teaching mode. It also requires students to actively study online and complete online tests according to the requirements of the course. Teachers can understand
the students’ mastery degree before class and adjust the key and difficult points of the course properly by means of this method. However, most of the current research focuses on the benefits of Cloud Computing Assisted Instruction (CCAI) and mobile learning (M-learning) to teaching and learning. The teaching mode and teaching design are comparative little in the cloud computing environment.

(2) The teaching evaluation system relative to cloud computing environment is not perfect, and the content of teaching evaluation is lack of observability.

There are many disadvantages in the traditional teaching evaluation. The teaching evaluation of students is top-down. The evaluation method is single which mainly includes paper homework and test scores. The evaluation of students should be diverse under network environment. Therefore, it is necessary to design a teaching evaluation system corresponding to the information age.

At the same time, the existing teaching evaluation content is relatively lack of observability. Many evaluation contents are not for the evaluators to evaluate the teaching implementation process, but for some abstract concepts. For example, "teaching concept", "teaching ability", etc. These teaching "terms" are not highly operational, which makes teaching evaluation and teachers' teaching behavior can not correspond one by one, and the evaluation results are not clear.

(3) Disjunction of Theoretical Research and Practical Application

At present, the research of teaching mode and teaching evaluation mostly stays in the stage of experience research. These research did not be applied in practice and the theory and practical application were separated.

Prospect

(1) An information teaching mode of collaborative communication should be to explore and form in the cloud computing environment to change the traditional teaching mode which students get knowledge by teaching, achieve the purpose of" teaching by learning", improve teaching standard and promote teaching quality.

(2) Design The teaching evaluation model in the cloud environment should be to design, which can objectively and fairly reflect the results of information teaching design, and promote the reflection of teaching and learning.

(3) The implementation process of the information teaching mode based on cloud computing should be to study to constantly improve the teaching mode, solve the problem of the disintegration teaching theory with practice, and provide help for teachers who use blended teaching.

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