Research on Advanced Mathematics Network Teaching System Based on Cloud Computing

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Abstract

In recent years, the traditional teaching mode has changed with the development of computer technology, and the traditional classroom teaching has changed to network teaching. In particularly, the cloud computing promotes the development of network teaching mode. The content of advanced mathematics is abstract due to complex objects and methods, and the derivation process is fuzzy, difficult for learning advanced mathematics effectively. Therefore, to change the status quo and improve the quality of advanced mathematics teaching, this paper proposes the advanced mathematics network teaching system based on cloud computing, so as to explore the application of cloud computing in advanced mathematics network teaching, and clarify the construction idea of advanced mathematics network teaching in colleges and universities.

Keywords: Cloud Computing, Advanced Mathematics, Network Teaching System, Construction Research.

1. BACKGROUND

1.1 Introduction

The development of information technology brought the big data and cloud computing, which greatly promoted the information in various fields, such as the field of education. In particular, the development of cloud computing changes the field of education, and strengthens the application of information technology so as to promote the information construction (Yang et al., 2016). At present, many colleges and universities have establishes the network teaching system using information technology. Due to the long hours of advanced mathematics, large amount of content, wide knowledge, strong specialty and high difficulty, the network teaching of advanced mathematics is difficult. Therefore, how to improve the level of advanced mathematics teaching has become an important topic of various colleges and universities. As an important basic course in the study of college students, the study of advanced mathematics can effectively train students’ reasoning ability and logical thinking, improve their problem solving and analysis ability, so that students can have higher scientific literacy and innovation ability, so as to provide theoretical basis and mathematical literacy for follow-up work (Fu and Ma, 2016). However, the students used to the passive acceptance of knowledge during learning of advanced mathematics, lack of long-term initiative. Therefore, changing the teaching mode of advanced mathematics becomes urgent. The cloud computing can integrate the teaching resources and network technology in the network, changing the teaching methods through the introduction of modern teaching concept, and bring reform on the curriculum, methods and means of advanced mathematics. The advanced mathematics network teaching system based on cloud computing can significantly improve the quality of teaching, which also attracts concern and favor of many teachers and students.

1.2 Purpose

This paper aims at constructing the advanced mathematics network teaching system using the cloud computing, so as to reform the current advanced mathematics teaching mode and bring innovative teaching methods and curriculums. Thus the students can learn the advanced mathematics inititatively in addition to breaking the time and space limitations, to achieve personalized teaching of advanced mathematics, improve the quality of teaching and leaning enthusiasm, train the innovation ability and reasoning ability, and lay a sound mathematical theory foundation, so that the students have excellent mathematical literacy (Cao et al., 2016). In this paper, an advanced mathematics teaching network teaching system is established based on cloud computing and the characteristics of advanced mathematics curriculum. This teaching system has functions such as online learning, testing, Q&A and others, and can provide targeted personalized teaching, thus effectively help students to learn advanced mathematics.
2. OVERVIEW OF CLOUD COMPUTING

Cloud computing is a kind of commercial computing model developed using Internet technologies. With cloud computing, computing tasks can be distributed widely in resource pool. Resource pool is composed of a large number of computers. With cloud computing, people can get the relevant information and hardware/software resources from the resource pool, and share the information and resources (Huang and Su, 2016). The cloud computing infrastructure is shared. It can deal with all the computing tasks in the network via the server, so that the user’s computer turns into a tool to receive data and resources, which greatly reduced the load of the computer and improve the efficiency, and thus improve the overall office efficiency. The goal of cloud computing is to share resources and information so as to provide help. The cloud computing features centralized storage. People can learn anytime, anywhere conveniently using network tools (Tian, 2016). In addition, we can establish database platform and cloud hosting network operating system and other infrastructure layers through integration of cloud computing and other technologies for virtualized and centralized management of resources and information, reducing investment in hardware/software and maintenance costs of the system (Guo and Shang, 2014). The domestic colleges and universities have made primary progress in the teaching resource integration in the cloud computing environment. With advanced mathematics network teaching system using the network teaching platform and combining advanced teaching ideas and methods, students’ ability for leaning advanced mathematics can be improved based on the teaching idea and professional features. In this way, the cloud computing will provide better services for the advanced mathematics education, achieving personalized teaching and autonomous learning of advanced mathematics, thus effectively improve the quality of teaching advanced mathematics.

3. FEATURES OF ADVANCED MATHEMATICS CURRICULUM

The theorem of advanced mathematics determines that for same change in the independent variable, as the value of

\[ f(x) \] is infinitely great, the value of \( \frac{1}{f(x)} \) is infinitely small, and in contrast, if the value of \( f(x) \) is infinitely small and \( f(x) \neq 0 \), the value of \( \frac{1}{f(x)} \) is infinitely great. It can be proved by the theorem, if \( \lim_{x \to \infty} f(x) = \infty \) and \( \forall \varepsilon > 0, M = \frac{1}{\varepsilon} \) can be deduced and inferred from the infinite large theorem, and \( \exists \delta > 0.1 \varepsilon < |x - x_0| < \delta, |f(x)| > M = \frac{1}{\varepsilon} \) can be deduced, and \( \left| \frac{1}{f(x)} \right| < \varepsilon \) can be further deduced. So \( \left| \frac{1}{f(x)} \right| \) is infinitely small as \( x \to x_0 \). It can also be inferred from the opposite. For example, if \( \lim_{x \to x_0} f(x) = 0, f(x) \neq 0 \) and \( \forall M > 0, \) it caninferred from the infinite small theorem, as \( \varepsilon = \frac{1}{M} \) and \( \exists \delta > 0, 0 < |x - x_0| < \delta \) can be obtained, and \( \left| \frac{1}{f(x)} \right| < \varepsilon = \frac{1}{M} \) can be further deduced. This is because as \( 0 < |x - x_0| < \delta \) and \( f(x) \neq 0 \), \( \left| \frac{1}{f(x)} \right| > M \) can be deduced. Therefore, the value of \( \frac{1}{f(x)} \) is infinitely great as \( x \to x_0 \). The same method can be used for derivation as \( x \to x_0 \) (Sun et al., 2014). It can be seen that, compared to primary mathematics, the methods and objects of advanced mathematics are more complex. In general, advanced mathematics is a basic course of engineering based on the theory of real theory, which discusses the integrals, continuous, limits and differential based on the continuity of the real (Chen, 2016). Students can lay a good foundation for following study through the study of advanced mathematics. Compared with other disciplines, advanced mathematics courses feature general learning, but there are two additional features: first, the content of advanced mathematics is very rich; second, the theoretical system of advanced mathematics is complex, so the advanced mathematics needs strong logic. The teaching materials are usually taught in the way of interpretation, students need to think about the process of knowledge during learning, for the symbols and languages in advanced mathematics are both general and abstract. Students shall understand and think in depth during learning advanced mathematics.

4. CONSTRUCTION RESEARCH ON ADVANCED MATHEMATICS NETWORK TEACHING SYSTEM BASED ON CLOUD COMPUTING

4.1 Research on architecture of advanced mathematics cloud computing network teaching system

The advanced mathematics network teaching system based on the cloud computing is divided into three layers: infrastructure layer, cloud computing management layer and application layer. All teaching resources for construction of the network teaching system in applications of cloud computing are called cloud services. Cloud services are the same as cloud computing. Nowadays, the construction of the network teaching system using cloud
services has developed in the field of education in Internet (Zhang et al., 2016). Figure 1 shows the schematic diagram of Advanced Mathematics Network Teaching System Based on Cloud Computing.

![Schematic diagram of Advanced Mathematics Network Teaching System Based on Cloud Computing](image)

**Figure 1.** Schematic diagram of Advanced Mathematics Network Teaching System Based on Cloud Computing

### 4.2 Online tutoring system based on cloud computing

The personalized network tutoring system based on cloud computing can help teachers, promote communication between teachers and students, so as to help students. This has become another form of extension and development of network teaching (Ma et al., 2016). The network tutoring system is mainly composed of five components: teaching program library, courseware library, teacher information base, teaching software library and case library. The teacher information library contains the individual information and contact of advanced mathematics teachers, so that the students can understand and contact advanced mathematics teachers. All slides and electronic lessons collected during lesson preparation and meetings by advanced mathematics teachers are mainly stored in the teaching program library and teaching courseware library, which are the essence for advanced mathematics network teaching. These two libraries can be integrated into the online lesson preparation system, so as to provide guidance for online lesson preparation. The teaching program library and teaching courseware library features forum, share, open and interactive. Thus teachers can improve their lesson preparation level and teaching effect, and enhance active teaching atmosphere. The teaching software library mainly stores a lot of online teaching software, which can help teachers in network teaching. The case library stores a lot of cases for advanced mathematics. Students can practice the advanced mathematics knowledge through the case library, and strengthen the master and use of knowledge (Ding, 2017).

### 4.3 Online learning system

At present, the concept of "lifelong education" advocated in the field of education coincides with autonomous learning. The construction of online learning system through cloud computing can realize the individualization and diversification of students. In addition, the online learning system can strengthen the emotional communication between teachers and students, so as to change the students' awareness, feelings and behaviors. This system can bring free learning space, so that students can choose contents of advanced mathematics based on their knowledge and theoretical basis. It can be seen that the online learning system can effectively improve the students' advanced mathematics learning initiative (Zhan, 2014). The online learning system is mainly composed of six components: learning courseware library, teaching experiment library, case library, search engine, exercise library and teaching video library. All slides and electronic lessons collected during lesson preparation and meetings by advanced mathematics teachers are mainly stored in the learning courseware library and the case library. The advanced mathematics teaching syllabus and related exercises developed in colleges and universities are stored in the exercise library. In order to strengthen the cultivation of students' practical ability, the practical advanced mathematics knowledge and experimental items will be stored in the teaching experiment library, so that students can experiment in a simulated environment (Ren et al., 2015). All advanced mathematics teaching video and video produced by excellent teachers based on their own teaching experience are stored in the teaching video library. In order to find the advanced mathematics resources that can meet the needs of students quickly, search engine shall be set in the online learning system.
4.4 Online test system of advanced mathematics network teaching

There are much content in advanced mathematics curriculum which is difficult to learn. For the freshmen who have just entered the campus, their knowledge of mathematics is different, and their learning ability is also different, so the teaching contents and methods provided by advanced mathematics teachers are different. Using traditional advanced mathematics teaching method, the teaching is difficult, and the students cannot understand, causing low enthusiasm for advanced mathematics, and they cannot test their master degree of the knowledge (Fu and Ma, 2015). With the online test system for network teaching based on cloud computing, students can test their master degree of the knowledge freely based on their learning characteristics and advanced mathematical theory. The online test system based on cloud computing mainly includes the following subsystems: online test system for network teaching, assignment system, test questions generation system, test questions management system. With these functions, students can select sections and type of questions of advanced mathematics freely, select the questions and knowledge from the database randomly, and conduct independent online testing. After completion of the test, the students can check the answers, so that students can understand their usage and master degree of relevant knowledge timely, so as to promote autonomous learning. In addition, teachers can select questions from the database randomly to prepare test questions, and modify, add and delete some questions in real time, so that the knowledge of test questions is more reasonable. With development of science and technology, the teaching reform in colleges and universities has been fully implemented. The construction of online test system will become the development trend. Therefore, the construction and design of the online test system for network teaching can lay a solid foundation for the advanced mathematics network teaching. Figure 2 shows the schematic diagram of online test system architecture of advanced mathematics network teaching.

4.5 Online Q&A system

With the online Q&A system based on cloud computing, students can solve difficulties and problems during learning advanced mathematics, grasp the knowledge quickly and reduce the time spent in the learning. In addition, through the online Q&A system, teachers can quickly grasp the difficulties in learning advanced mathematics and knowledge difficult to grasp, so that the teaching becomes more targeted (Pan and Rong, 2017). An evaluation system should also be built in the online Q&A system. Through evaluation of the quality of advanced mathematics teaching with the evaluation system, the teachers can grasp the problems of teaching and students' psychological dynamics in real time, so as to provide reference for improvement and adjustment of teaching methods.

4.6 Resource management system

With the resource management system, the lesson preparation and teaching research of advanced mathematics becomes efficient, science and modern. The resource management system based on cloud computing includes the following subsystems: monitoring management, network system management, system configuration and cloud service storage setting. For advanced mathematics teaching, teaching resources are crucial. Only by ensuring the quality of teaching resources, can students and teachers use the teaching resources efficiently. In this system, the administrator can review, assess, amend, add and delete related teaching resources of advanced mathematics, so as to improve the efficiency of advanced mathematics network teaching system.
5. BRIEF CONCLUSION

In summary, cloud computing has greatly promoted the reform in the field of education and accelerated the process of information construction. For advanced mathematics courses, the application of cloud computing in the network will improve the quality of advanced mathematics teaching and achieve the goal of personalized training for students. With the development of information technology, cloud computing technology will also become more and more mature. The network teaching system based on cloud computing will be constantly improved. This is significant for improving our education.

REFERENCES

Zhan S.Q. (2014). New Exploration on the teaching of data mining under the background of big data, Journal of Changchun Institute of education, 30 (22), 81-82.