Design and Application of Multimedia Teaching Video System for Dance Major Based on Cloud Computing Technology

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Abstract—**There are more and more users of mobile internet. In teaching system, as equipment used by each school is complicated and network heterogeneity constantly improves, users have higher and higher requirements for video service quality. However, traditional multimedia on demand website can only provide simple multimedia services and traditional multimedia system can no longer meet the increasing demand of users. Therefore, some infrastructures, system architecture and service ability should be improved and upgraded. This paper designs a multimedia teaching system based on cloud computing and introduces its design idea, system structure and application. The teaching experiment proves that this system has better teaching application effect and results in better academic performance of students than traditional teaching method and that it can improve students' comprehensive quality effectively and has certain operability and feasibility.**

Index Terms—**cloud computing, multimedia teaching system, choreography course, dance major**

I. INTRODUCTION

Global information technology field has new reform with social progress. As an advanced technical form, cloud computing has gradually aroused wide concern of academic circles. Under the circumstances of "low cost and high innovation" in technology constantly explored in each industry, cloud computing technology becomes the focus of the whole electronic information industry as it can not only reduce IT system cost and energy consumption and improve productivity, but also promote informatization of the whole society [1]. Cloud computing is a mode with payment based on usage amount, which provides available, convenient and on-demand network access and enters configurable computing resource shared pool (resources include network, server, storage, application software and service). Such resources can be provided rapidly. Only a little management work or interaction with service supplier is required [2]. College education is vital in the development of a country. Besides ordinary teaching tasks for students, colleges and universities also need to train high-tech cutting-edge talents for the country. Therefore, information construction of colleges and universities has profound significance. Correspondingly, the application of cloud computing technology in college informatization aided teaching accords with the development and demand of the era [3]. Amazon Web Services (AWS) sponsored the University of California at Berkeley in moving the administration of one of its courses onto a SaaS cloud as it required the allocation of a large number of servers within a relatively short period of time [4]. The report of Thomas pointed out cloud computing technology is also applicable to library work in colleges and universities, which can establish a large knowledge platform for teachers and students. Everyone can work in the same file and meanwhile make corrections with the method of cloud technology, which is good for dynamic information updating [5]. Li [6] first put forward the concept of cloud computing assisted instructions (CCAI), which means that a personalized teaching environment can be established with cloud service platform so as to assist teachers in teaching and promote the communication between teachers and students and collaborative learning of students. He et al. [7] explored its use condition and specific application as cloud computing assisted instruction platform according to features of Microsoft One Note 2010. Zeng et al. [8] combined cloud computing assisted teaching technology and flipped classroom and applied it in the teaching of software engineering major. The experimental result shows that the new computer aided technology is more popular among students than traditional multimedia teaching.

As an item with the sense of the times, Dance Teaching in art course is loved by more and more people. However, there are many problems in its teaching, mainly including single teaching form, i.e. students only listen to the teacher in the training room or classroom or watch multimedia teaching video, and incomplete corresponding teaching facilities [9]. Such teaching status makes it difficult for students to have real and correct feelings for dance movement. Such classroom teaching method is also limited by time and space and students' review for learning contents after class is also influenced [10]. Therefore, it is necessary to reform traditional teaching mode, make full use of modern information technology, greatly promote its application in teaching process and exploit its advantages to the full.

This paper designs a multimedia teaching system based on cloud computing mode under internet background, i.e. multimedia teaching on demand system based on cloud computing environment which has a brand new architecture and can adapt to the change of network flow dynamically, avoid the waste of a lot of hardware resources and effectively improve work efficiency. Moreover, information storage module of the system saves client information corresponding to client. Client information includes client searching records, client multimedia on demand records and client playing progress records. Its ap-

plication in dance teaching can provide more help for students' study and teachers' teaching. It can constantly optimize and enrich classroom contents of students and improve the quality of art course teaching.

II. DESIGN OF MULTIMEDIA TEACHING SYSTEM BASED ON CLOUD COMPUTING

A. Design idea

The system includes client module, client communication module, multimedia server module, distributed multimedia data storage module and multimedia data coding and interpretation module. Work process: after users give a command in client, the request goes to client communication module and then is transmitted to multimedia server module. Multimedia server module obtains static video file from distributed multimedia data storage module in cloud platform. After multimedia data coding and interpretation module conducts coding computation according to playing requirements, a file with specific playing features is obtained and transmitted to client via client communication module. This system is a multimedia teaching system based on cloud computing environment, which can monitor the change of network flow in real time and realize dynamic adaptation. Moreover, multimedia video accessed by clients is stored in central server, which can greatly improve playing speed and quality and guarantee the safety and stability of the whole system [5].

B. Design structure diagram

According to Figure 1, static video file is obtained from distributed multimedia data storage module. After multimedia data coding and interpretation module conducts coding computation according to playing requirements, a file with specific playing features is obtained and transmitted to client via client communication module. The whole process is based on cloud computing. It can guarantee data adaptation to the dynamic change process of flow and improve the playing performance and security of multimedia teaching system.

According to figure 2, multimedia teaching system based on cloud computing centers on cloud computing network platform and establishes a bridge for data flow and exchange. However, multiple multimedia network servers are used during the operation of data file, which can effectively control data flow and guarantee normal playing of media file. In addition, users can download client for login or login with web version in the multimedia teaching system, which is convenient, has the advantage of distributary and can improve operating performance.
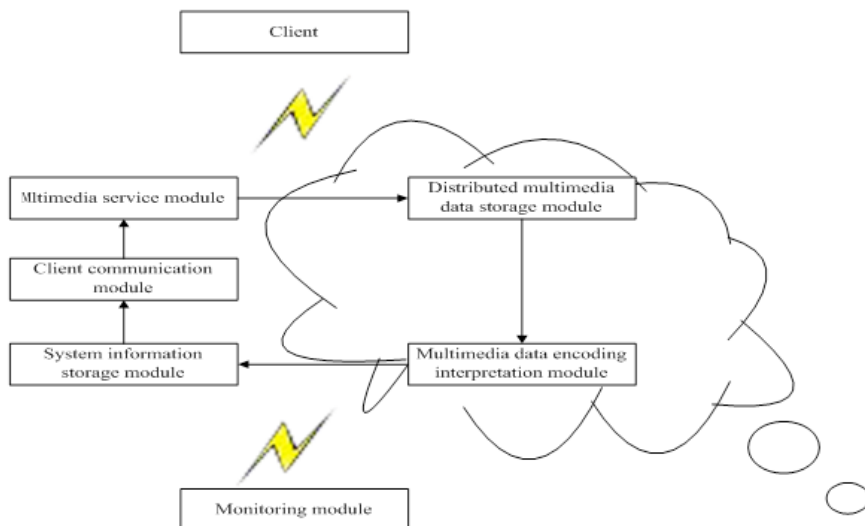

Figure 1.   Structure diagram of multimedia teaching system based on cloud computing
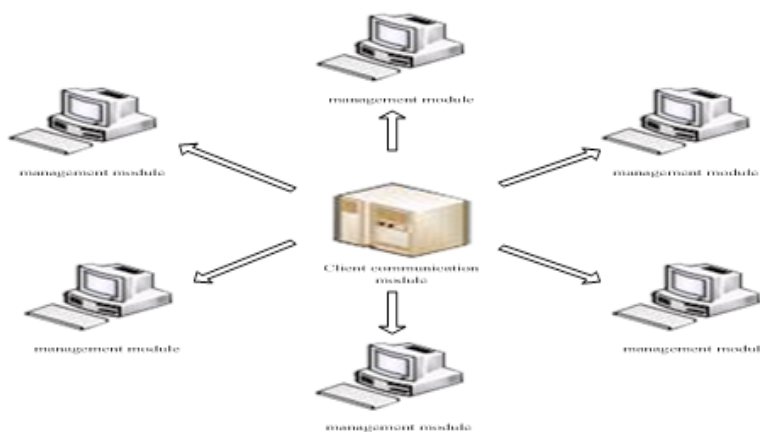

Figure 2.   Overall architecture diagram of multimedia teaching system based on cloud computing

According to figure 3, multimedia server module of the system also includes cache storage module which is used for storing interest multimedia files respectively corresponding to each user that are obtained by data analysis module of the system mentioned and updating storage address corresponding to multimedia file in information storage module of the system.

C. System application

Figure 4 and Figure 5 are interfaces presentation after client login. The page showing a teacher giving a class to students is now presented. According to the figure, student list and intelligent push list are included. The main interface is the teacher's courseware, showing teaching resources and specific course information. Modules such as teaching resource, simulated exercise, work appreciation and interaction between teachers and students are set in the menu bar on the top of the page. In addition, software package can be added to the system based on different courses and different functions can be provided. It is adapted to the current teaching process more flexibly and conveniently.
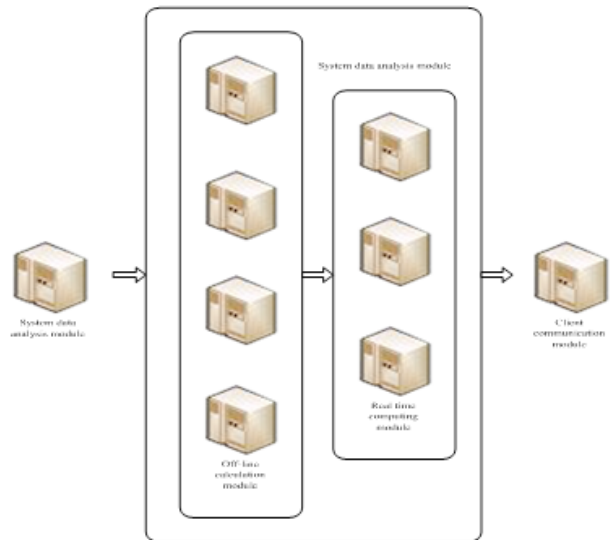

Figure 3.   Cache storage module of multimedia server module
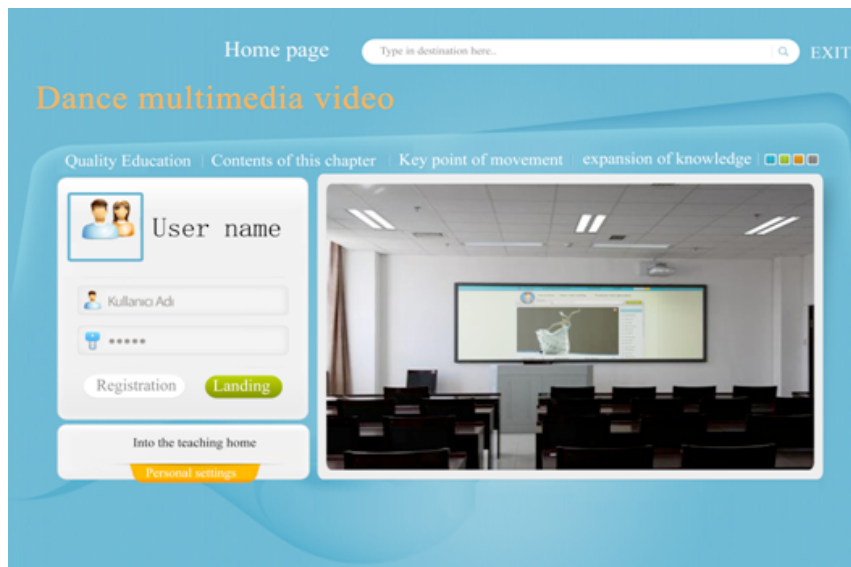

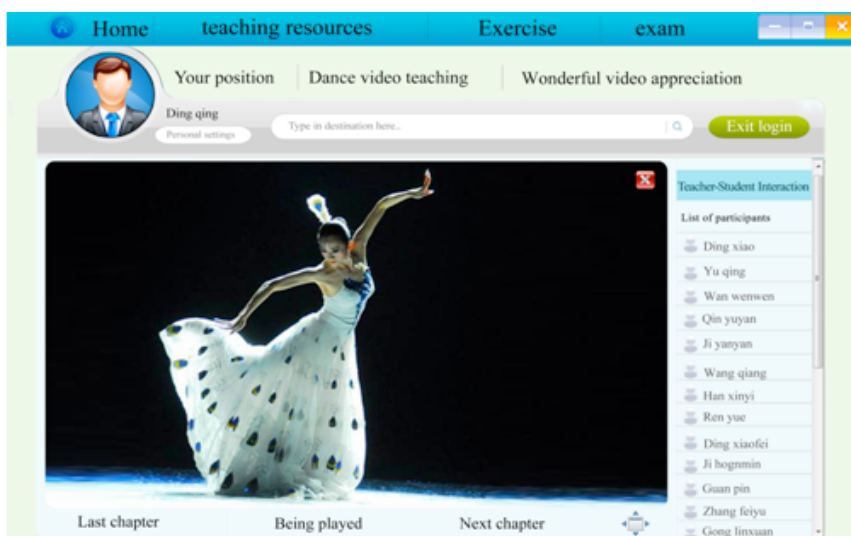Figure 4.   Full view of multimedia classroom based on cloud computing

Figure 5.   Interface presentation of multimedia video teaching system based on cloud computing

III. EXPERIMENTAL PROCESS OF SYSTEM APPLICATION

A. Objects of experiment

87 students in two classes of dance major in grade 2013 with four-year schooling in our college were selected. They were divided into experimental group (multimedia teaching group) and control group (traditional teaching method) randomly with teaching method based on class. There were 43 students in experimental group and 44 students in control group. Their differences in age, gender and earlier academic performance had no statistical significance (P<0□05). Therefore, they were comparable.

B. Course setting and teaching method

Choreography course is a required course of sophomores in our college. The study of this course allows students to master professional knowledge and improve their abilities of expression of dance movement and problem analysis.

(1) Traditional teaching. Teachers are the subject. They impart basic knowledge of medical scientific research to students through oral narration.

(2) Multimedia video teaching. Network online video teaching method is used based on course content. All course contents are imparted to students with multimedia methods such as picture, sound and video. Students can interact and communication with teachers in class and the atmosphere is quite relaxed.

C. Teaching effect evaluation method

Students in both groups attended a 30-minute closed-book exam for testing relevant teaching contents after the evaluation of knowledge mastery and the completion of teaching tasks. There were 25 choice questions, each of which had 4 scores. The total score was 100.Unregistered questionnaire survey was conducted on students in both groups with self-made Teaching Effect Questionnaire, which included ten questions for the evaluation of teaching method and effect. "Yes" or "No" was the only answer.87 copies of questionnaire were distributed and recovered. The recovery rate was 100%. There were 87 effective questionnaires and the effective rate was 100%.

D. Statistical method

Data were analyzed with SPSS13.0 statistical software. Quantitative data were expressed with standard deviation of the mean. T-test was conducted on independent samples for intergroup comparison. Qualitative data were expressed with case number and percentage. Chi-square test was conducted for the comparison of both groups. P<0.05 shows statistical significance of differences.

E. Result

(1) Comparison between the two groups of students with respect to their interest in engineering measurement and satisfaction with course arrangement:

According to fig6, the test mark of experimental group was 84.2±8.1, higher than 79.1±9.2 of control group. Their comparative difference has statistical significance (t=2.742, P=0.007). Multimedia teaching method can help students master relevant theoretical knowledge. Due to lessons given with multimedia teaching system, students can master more information in the course and classroom contents are presented vividly, thus helping students understand and memorize relevant theoretical knowledge rapidly and deeply. Therefore, the application of multimedia teaching system in dance teaching can effectively help students master professional theoretical knowledge.
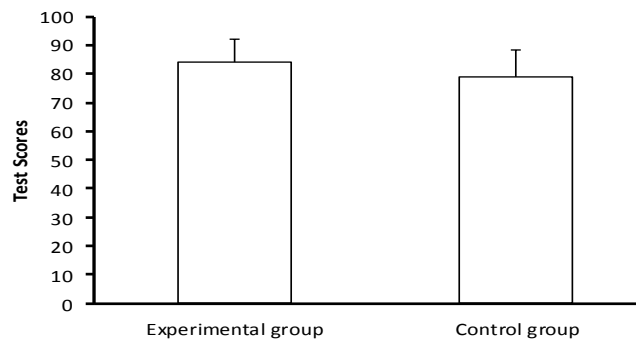

Figure 6.   Comparison of students' mastery of knowledge

According to Table I, the evaluation of students in experimental group with respect to deep impression on movement learnt, knowledge mastery, improvement of movement expression ability, improvement of problem solving ability, improvement of interest in major, expansion of extracurricular knowledge and improvement of comprehensive quality is better than that of students in control group. Their difference has statistical significance (P<0.05). There is no statistical difference (P>0.05) in terms of the improvement of teamwork ability and self-study ability.

TABLE I.
COMPARISON OF STUDENTS' EVALUATION OF TEACHING EFFECT [NUMBER OF STUDENTS (%)]

No.	Indicators	Experimental group (N=43)	Control group (N=44)	χ^2 value	P value
1	Deep impression on movement learnt	26(60.5)	17(38.6)	4.15	0.042
2	Knowledge mastery	27(62.8)	15(34.1)	7.17	0.007
3	Improvement of movement expression ability	33(767)	19(43.2)	10.19	0.001
4	Improvement of problem solving ability	31(72.1)	18(40.9)	8.60	0.003
5	Improvement of teamwork ability	27(62.8)	24(54.5)	0.61	0.435
6	Improvement of interest in major	34(79.1)	25(56.8)	4.93	0.026
7	Improvement of self-study ability	24(55.8)	18(40.9)	1.93	0.164
8	Expansion of extracurricular knowledge	31(72.1)	22(50.0)	4.46	0.035
9	Improvement of comprehensive quality	25(58.1)	16(36.4)	4.14	0.042

It can be seen from Table I that the multimedia video teaching method can effectively improve students' abilities of data analysis and research topic selection, which are 23.3% and 14.5% higher than those of the traditional teaching group. Thus, the multimedia video system teaching based on web server is more effective than the traditional teaching.

According to the table above, multimedia teaching video system based on cloud computing can improve students' classroom teaching effect. Students have higher evaluation for teaching effect compared to traditional teaching method. Therefore, the greatest influence of this course on students with either traditional teaching method or multimedia teaching method is that it can improve their interest in the major. Therefore, it is necessary to offer such course. Moreover, the teaching method of multimedia teaching system can effectively improve students' abilities of movement expression and problem solving, respectively increased by 33.5% and 31.2% compared to traditional teaching method. We can also see that instructions with multimedia teaching system based on cloud computing allow students to improve various abilities based on the mastery of professional knowledge and then expand their comprehensive quality.

IV. CONCLUSION

(1) This system optimizes work process of teachers. Cloud computing technology has universality and can make the teaching system have flexibility and universal applicability. Meanwhile, the system becomes intelligentized through the addition of intelligent recommendation technology. The system has memory function, which can analyze users' browsing or playing records backstage, cooperate with filtration technology for the extraction of preference features of users and then recommend similar resources to users intelligently. Moreover, signing system is set up. The list of students attending class can help teachers count students' attendance in teaching process and obtain feedback information timely. The above provides a good knowledge expansion resource for teachers in work and constantly optimizes the teaching process of teachers.

(2) This system is good for improving students' comprehensive quality. According to the analysis above, multimedia teaching system based on cloud computing plays a great role in dance teaching and causes great changes of teaching contents, means and mode. First, the application of the new teaching mode in traditional teaching process can effectively assist dance teaching, pay attention to the learning process of students, actually center on students and promote the formation and development of their innovation ability. Second, playing and presentation of dance movement video. Multimedia technology allows students to play key and difficult movements emphasized in class repeatedly and deepen the impression of students. Third, a good feedback mechanism can be developed through teaching with video recording technology. Combined dance movements of students or teachers can be recorded. Interaction and comparison can be conducted through the observation of movements in the video. Therefore, students can observe dance movements as a bystander and conduct self-comparison or comparison with others and teachers so as to discover their advantages and disadvantages and make self-corrections and improvements.

Finally, besides teachers' guidance in class, students can also spend spare time on independent study with multimedia teaching system, download or shoot some dance performance and teaching videos and conduct extracurricular self-study through multimedia technology.

In short, this research obtains the feasibility of multimedia teaching system based on cloud computing in college dance teaching process. Multimedia teaching technology and cloud computing technology are constantly updated teaching means. How to use such technologies for better dance teaching requires further research and discussion. According to this experiment, we see advantages and wide prospect of modern teaching technology and should use it flexibly and optimize teaching means so as to achieve the purpose of improving teaching effect.

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