Design and Implementation of Multimedia Remote Teaching Platform

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Abstract. Multimedia remote education is an education mode through using computers and computer networks, thereby reaching the purpose that students and teachers can complete education activity in different regions at the same time or in different regions at different times. Traditional remote teaching platform with software as system core has larger system risk. In remote teaching system with hardware as the system core, functions of all parts are realized in single hardware equipment singly by the core equipment. Failure of the whole teaching system due to single equipment faults can be avoided through overall system integration, thereby improving overall stability of the system.

Introduction

Multimedia teaching technology is a hot spot and bright spot, which is developed in recent years. Firstly, it has the advantages of previous modes based on audio and video interaction; secondly, it is fully combined with computer and network technology. Collaboration of various data, work coordination and other functions are applied more thoroughly [1]. Meanwhile, expensive network and equipment investment can be avoided. The system is more convenient and easier to use. Therefore, the multimedia education system based on network is generally focused and popular by colleges and universities as well as various education institutions in recent years [2,3].

Remote teaching platforms of traditional mode are mostly based on software as system core. The software system has the biggest advantage that the remote teaching system has low cost, but there are also larger system hazards: software system is established on Windows operating system or similar platforms, system security and stability are directly related to use of teaching system; multiple teaching system and operating system for the hardware platform of resource competition; A variety of teaching application system USES the same hardware platform of conflicting and resources competition; Software virus and so on will have an effect in the teaching system.

Functions of all parts are realized in single hardware equipment individually by core equipment in the remote teaching system aiming at the above problem. Failure of the whole teaching system due to fault of single equipment can be avoided through overall system integration, thereby improving overall stability of the system.

Demand Analysis

A set of remote teaching meeting system based on IP campus network and Internet should be established, including multimedia video classroom, course recording room, teachers' desktop terminal and remote training software system [4,5].

Multimedia classroom constructed in the internal campus network should meet daily teaching of students. Meanwhile, one special course-ware recording teaching room for teachers should be additionally constructed, thereby realizing recording of lecture video. It can be provided for students in the school or remotely-registered students for self-learning.

In the campus, personal special multimedia communication platforms are installed in offices of school leaders and teachers, thereby realizing interaction with campus multimedia classroom. Meanwhile, it also acts as a communication platform for daily office work between school leaders and teachers for internal meeting, teaching plan, etc.

Design Principles of the System

Progressiveness Principle. The progressiveness principle can make distance education system relatively keep pace with era, in order to prolong the life cycle of the entire system as much as possible.

Compatibility Principle. The system follows the principle of openness and standardization. It can interact with products with different brand and the same standard, thereby ensuring overall system integrity and equipment comprehensive compatibility after multimedia expansion in the future.

Expansibility Principle. Taking into account the medium-term and long-term expansion of the system, the system should adapt to the future needs of remote teaching and learning in the network architecture, network applications, network management, system performance, and other aspects.

High Reliability Principle. In the design the multimedia remote teaching platform, the reliability points such as human-computer security, long-term stable operation should be given top priority, to ensure the personal safety and system security during the use of the system. Upon the above reliability requirements being satisfied, the program should be optimized as far as possible to reduce equipment investment.

Economically Practical Principle. The design of the system should focus on economics and practicality, reduce overall cost, and seek the perfect union of the progressiveness and economics, thus make the distance education system more cost-effective.

Networking Plan of Remote Teaching System (Fig. 1)

Multipoint Control Unit. Simple and easily managed remote education and training services are provided, such as multi-party video, audio and integration (video, audio and content). It is used for access management of multi-point teaching and training.

Multimedia Record Server. Multimedia record server is used for completing recording of teaching system audio and video. The record system is divided into two parts of codec and recorded server. The codec is installed in the audio and video terminal of multimedia classroom and courseware studio, thereby completing real-time audio and video collection, coding and transmission. Recorded server is installed in video conference machine room for completing recording and multicast functions of audio and video.

Courseware Release and Vod Server. The vod server can realize vod and viewing functions in order to meet the application of a lot of registered students outside the campus. Vod user name/account names can be opened through servers. It can be released to users/students of multimedia teaching platform. School management personnel can collect fee rationally according to viewed content on the basis of account number, thereby realizing sharing and avenue of teaching media resources.

Multimedia Classroom Terminal. Multimedia classroom terminal can be used for transferring out two paths of high-definition images at the same time. One path refers to video for teaching lecturer, the other path refers to video of teaching courseware. Audio and radio terminal is designed separately. The camera can be installed on the back of the classroom. Teacher close-up images can be clearly watched through optical zooming for many times. If many cameras are installed in the multimedia classroom, the terminal also can be connected with the second high-definition camera at the same time, and it can be placed in different position to get video of the multimedia classroom from different angles.

Teacher Desktop Terminal. In the campus, personal special multimedia communication platforms are installed in offices of school leaders and teachers, thereby realizing interaction with campus multimedia classroom. Meanwhile, it also acts as a communication platform for daily office work between school leaders and teachers for internal meeting, teaching plan, etc.

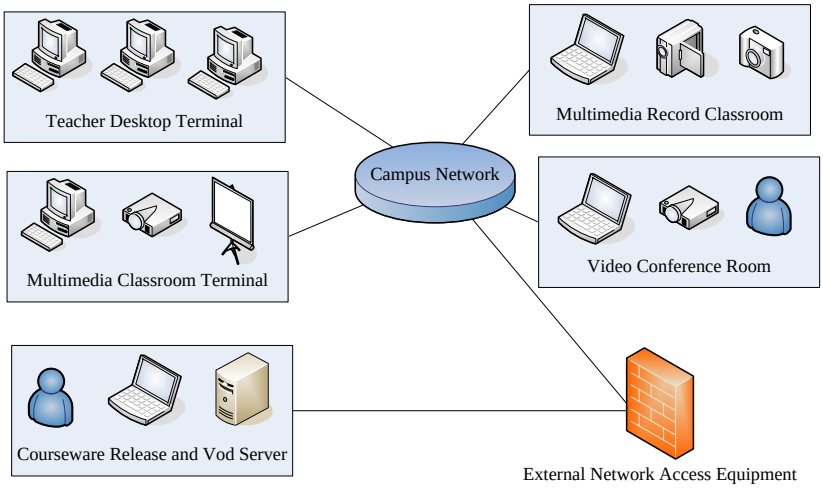

Figure 1. System networking figure

Function Design of Remote Teaching System

Audio-radio terminal and multi-point interactive server MCU configured in multimedia teaching system have flexible and powerful functions. Users can organize various teaching plans according to own specific application requirements: point-to-point teaching modes (between two multimedia classrooms), multi-point teaching based on MCU (among many multimedia classrooms), remote student software participation teaching mode, etc [6,7].

Point-to-point Teaching Mode. Teachers implement one-on-one teaching or tutoring with appointed remote teacher according to the curriculum arrangement. The multimedia teaching platform is shared by teachers and students. Any one multimedia teaching terminal in the teaching system (multimedia classroom or courseware recording room) can be used for calling terminal of any registered student in the teaching network directly, thereby establishing two-way connection for meeting, teaching and exchange [8].

Multi-party Training Teaching Mode. Multi-party teaching is one of the main application forms of network remote teaching. The teaching mode can be completed through cooperation among MCU, multimedia classrooms, recording room and terminals of students registered in different regions.

Teaching Mode of Synchronous Application of Multiple Courses. All teachers respectively establish and manage their own classrooms and/or remote students to joint own network classrooms. Courses of different teachers are held at the same time without influence.

Teaching Mode of Multi-Party Teaching. Participants should be strictly defined in advance aiming at lecture which is held in many multimedia teaching rooms. Before the meeting is held, participation teaching rooms should be determined. Other rooms are not allowed to join the course for listening to the course. After the course is started, participants can be called in or out, the course can be locked for promoting any terminal from joining the conference, thereby fully guaranteeing the system safety [9,10].

Recording of Teaching Courseware. The multimedia classroom audio and video terminal is provided with coding module of recording server, which is responsible for collecting and coding teaching video, teaching courseware and voice. They are transmitted to recording server of campus network central machine room for storage through network.

Recording of Recording Room Courseware. In multimedia courseware recording room, document explanation process can be recorded through video and audio terminal. In addition, document can be integrated with two videos of teachers.

Courseware Downloading. Users can download the prepared teaching data through logging in the server or using special tools.

Conclusions

Remote conference system technology can be relied for realizing network remote education and braking through the limitation of traditional teaching and training in time and space. The course can be taught in different places, in real time, interactively or selectively. Modern network remote education can effectively make up for the inadequacy of the classroom learning or training through unique elastic design and highly interactive function. It has become a new trend in the development of education industry.

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