

The Reform of Computer Distance Learning Based on Virtual Reality Technology and its Application

Kun Cheng

e-mail: chengkun112233@sina.com

Shandong Institute of Commerce And Technology, Shandong, Jinan, China

Abstract—With the rapid development of science and technology, people also put forward higher requirements for computer technology, which requires us to continuously improve the technology related to computer distance learning, so as to meet people's needs for the development of the computer information age. Computer distance learning has become a new development trend, which plays an important role in promoting human social progress and scientific and technological innovation. It can not only improve the quality of teaching and enhance students' interest in learning, but also cultivate a group of students with good computer professional technical level and practical skills, and can adapt to the needs of social development. This paper mainly introduces the electronic distance training platform based on virtual reality technology and its application, explains its role in computer distance learning, and outlooks the future development trend.

Keywords-Virtual reality technology. Computer distance learning. Reform and its application

1 INTRODUCTION

With the continuous development of computer technology, people's learning style and learning content have also undergone great changes in a subtle way. The traditional teaching mode can no longer meet the requirements of modern society for personnel training, so we have to use advanced means to change the status quo of the classroom. Remote training is a new teaching method based on virtual reality technology, which can help students better train themselves interactively and share knowledge, improve the level of computer network applications, etc. It can also effectively improve the teaching efficiency of computer network technology and students' learning effect, which to a certain extent can also exercise people's ability to deal with problems and improve their overall quality. Therefore, it is very necessary to combine it with computer remote technology to make it a new type of practical training course. This paper firstly describes the virtual reality technology and its features. Virtual reality has three basic features, including immersion, interactivity and multi-sensory, and virtual reality technology can simulate human behavior. Through computer distance learning, students are able to make full use of multimedia devices for knowledge embellishment, interaction and communication in the learning process; secondly, this paper studies the design of computer distance learning system and mainly elaborates the functional modules of distance learning; finally, this paper studies the application of virtual reality technology in computer distance learning reform [1].

2 VIRTUAL REALITY AND ITS CHARACTERISTICS

Virtual reality is a computer-generated virtual world (environment) that gives people multiple sensory stimulation. It is a computer virtualization method to simulate the perception, understanding and feeling of objective things and real environment in the real world, and transform it into an intuitive and visual operation experience, which can also realize multiple sensory stimulation. Based on this, the conceptual model of virtual realization technology is shown in Figure 1. Computer distance learning is based on modern science and technology, using advanced multimedia technology and network communication to effectively communicate between students, teachers and instructors. This approach not only enables learners to establish a harmonious and cordial relationship in the virtual world, but also enhances their own perceptual abilities, thus achieving the corresponding course objectives better and faster [2].

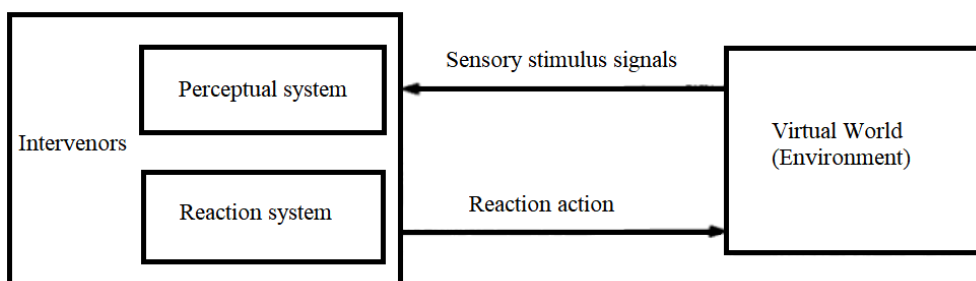


Figure 1. conceptual model of virtual realization technology

Virtual reality is an emerging engineering technology in the field of information science, which is an emerging discipline integrating computer graphics, imaging and animation technologies, and it is a computer as a carrier to achieve various functions through information processing by means of programming or simulation. Virtual reality has three basic characteristics: (1) immersion; (2) interactivity; (3) multi-sensory. In the process of computer distance learning, we can organically combine virtual reality technology with the traditional course learning mode through multimedia technology, so as to achieve the purpose of improving classroom efficiency and students' information literacy level [3].

3 COMPUTER DISTANCE LEARNING SYSTEM DESIGN

3.1 System Related Technologies

3.1.1 Hadoop Cloud Storage Technology

In computer distance learning, Hadoop is a good technology which can store a large amount of information and also can quickly respond to different users' requests for data access. Hadoop cloud storage is based on the common and effective storage of data information in computer distance learning. It can effectively solve the data storage problems existing in traditional distance education, and it can quickly respond to different users' requests for information resource access, thus improving the level and quality of computer network technology

applications. Hadoop is an open source framework proposed by Apache organization, which can provide a simple framework for computer distance learning and can support a variety of applications, which can largely improve the level of network technology applications.

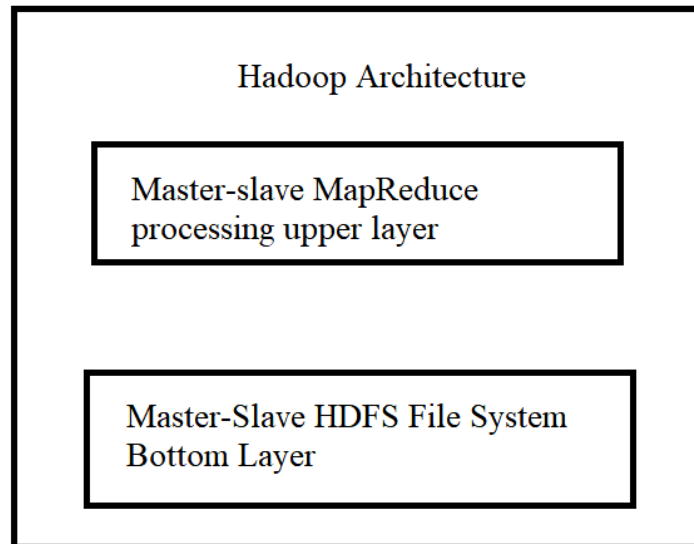


Figure 2. Basic model architecture of Hadoop

Hadoop consists of two main components: the HDFS distributed file system and the MapReduce distributed computing model. It is a distributed file system, and this type of applications are called BX files, which have a high capacity, can access system information resources in an infinite loop when used in a specific situation and support different operation modes or application service files to meet system requirements. Its main advantages are that it does not require disk space occupation, regular maintenance, and open operations, etc. It also provides a highly scalable file system structure that is unmatched by other functional modules that he uses to store data and handle user requests. Its structure and functionality have been greatly improved compared to traditional file systems. In practical applications, this type of application is widely used because of the high data resource usage and maintenance workload [4].

The working process of HDFS file system is like this, first the NameNode receives the user's request to create a file, creates a virtual environment in the file, then the user enters the parameters according to their needs, and finally by compiling the file. The HDFS file system uses the standard TCP/IP communication protocol and is actually a dynamic data storage system built on a Linux file system, which is composed of many nodes. Each node can share a single device with each other and use it for information exchange. It is composed of many nodes, each node can share one device and use it to exchange information. Modern communication technology and multimedia software development based on computer network environment and TCP/IP protocol are used to realize its functions in virtual machine distance learning.

MapReduce model is the core of distributed database system, through which data can be

collected, processed and analyzed with high analysis efficiency, and it can provide users with more humanized, intelligent and visual services. Distance learning is a new curriculum system proposed and realized under the background of computer technology development. The system takes virtual reality theory and modern network communication principle and digital multimedia application as the main contents, and builds a complete and efficient modern open classroom teaching mode with strong generality, simple structure and powerful operation and maintenance by combining computer software and hardware [5].

The working process of MapReduce is divided into two phases: the map phase and the reduce phase. Among them, "map" is to decompose a task into multiple tasks, and then these tasks are combined together in a certain order to form a virtual reality environment that can be executed and can run multiple programs, which is mainly done by computer simulation system to simulate the human brain. "reduce" is to put together the results of the decomposed multitasking, and carry out animation output, so as to realize the simulation of the virtual environment. This stage is mainly through the computer distance learning, so that students in the learning process can be faster to master and understand the content. The Reduce function is used to merge all the intermediate value values with the same intermediate key value, as shown in Equation (1).

$$\begin{aligned} & \textit{map}(k1, v1) \rightarrow \textit{list}(k2, v2) \\ & \textit{reduce}(k2, \textit{list}(v2)) \rightarrow \textit{list}(v2) \end{aligned} \quad (1)$$

3.1.2 J2EE Technology

J2EE is a complete architecture based on a new technology that combines the disciplines of computer networking, communications, and artificial intelligence. It contains a lot of complex and complicated knowledge, such as: data management and maintenance, accounting information processing, software development and maintenance, and many other areas that require a lot of specialized technology. Computer distance learning can help students improve their understanding of professional knowledge and skills, as well as effectively enhance their application of theories in practice, thus cultivating comprehensive application-oriented talents and realizing the integration of computer distance learning and practical training [6].

The J2EE multi-layer architecture is ultimately distributed in three locations: client side, server side and database side. The architecture is built not only to meet the user's requirements in terms of computer technical knowledge and information security, but also to take full account of the existence of certain difficulties in the teaching process. By analyzing and studying the problems such as poor learning effect of students and uncoordinated teacher-student relationship under the traditional teaching mode, this paper proposes the design idea of computer networked management and control function module and related data transmission system based on the remote training platform of virtual reality technology (D-PSC), and expands and extends it by applying the architecture on this basis. Finally, a new set of computer distance learning architecture model is developed as well as its application in practice.

3.1.3 HTML Technology

The use of HTML technology is a good aid in computer distance learning. It can help students learn quickly. Traditional classrooms use both blackboard and whiteboard, which makes them less attractive and less interactive for students and teachers. The use of web pages as the main carrier can effectively improve the interaction effect and reduce the burden of teacher's explanation. The use of Web technology in distance learning is a new type of aid that helps students learn quickly.

3.2 System Function Design

The main function of computer distance learning is to provide a virtual environment for students to simulate real scenes using virtual reality technology, so that they can complete the corresponding tasks in the learning process without further debugging operations on the equipment [7]. The functional modules of the computer distance learning system are designed as shown in Figure 3.

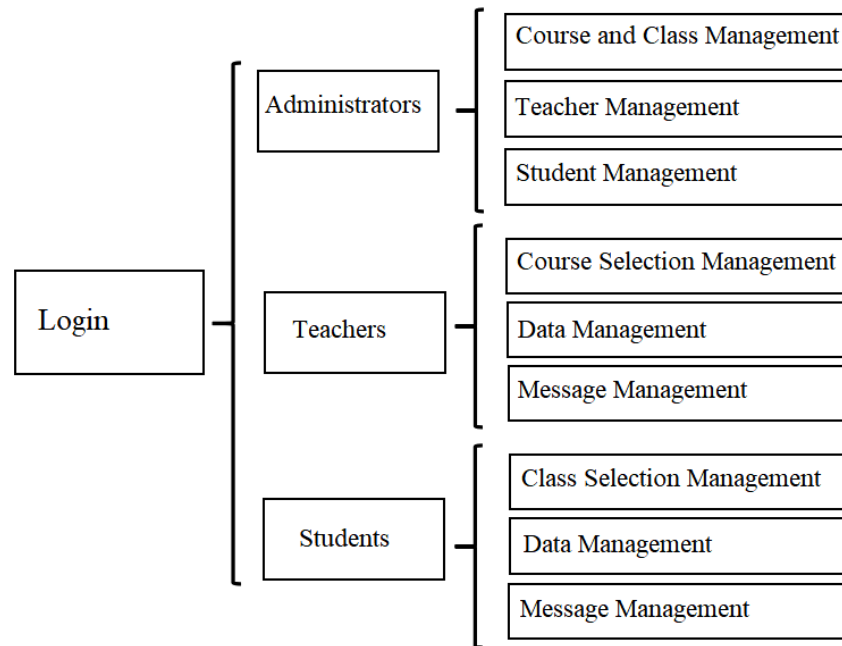


Figure 3. functional module design of the system

3.3 Database Structure Design

The database design of computer distance learning mainly refers to the construction of a structure with documents as the main components and organic links to realize the functions of storing, reading and processing data. First of all, before the data model is established, it is necessary to determine the permissions and attributes of each level of users; secondly, according to the size of the responsibilities required by different levels of users to use the system, it is necessary to assign the trade-offs between the relevant modules in the

corresponding roles; finally, the database is divided into several sub-table classes and each type of folder with information representation and named respectively, so as to realize the management and maintenance of its functions. In the process of computer distance learning, virtual reality technology can be used to collect, process and transmit information [8]. The data table composition of the teaching system database is shown in Table 1:

Table 1. Data Tables of The Teaching System Database

| Data Table | Function |
|------------|--|
| Student | Student Basic Information |
| Teacher | Teacher Basic Information |
| Admin | Basic information for administrators |
| Course | Course Information |
| Liuyan | Message Board Data Information |
| Classes | Class Information |
| Enrol | Application class acceptance information |
| Liebiao | Study material information |

4 THE APPLICATION OF VIRTUAL REALITY TECHNOLOGY IN COMPUTER DISTANCE LEARNING REFORM

With the continuous development of computer technology, virtual reality technology has gradually become a powerful tool for teaching reform and improving students' learning performance and promoting the application of computer network information technology in many countries and regions in the world today. Under this new teaching mode, there are more problems in the traditional classroom in the traditional sense. For example, the traditional classroom can not fully mobilize the interaction between teachers and students, teachers can not fully understand and control the behavior of students, these problems will have a greater impact on the effectiveness of the lesson. Virtual reality technology can effectively solve these problems and provide new ideas and breakthroughs.

The application of virtual reality technology in distance education is mainly in four areas:

- Knowledge learning. Knowledge learning means that the distance education students use the virtual reality system to learn various knowledge, form their own knowledge system and be able to learn in the computer; while mastering the understanding and applying these techniques and abilities means that the distance education students use the virtual reality system to realize the access to various information resources, so as to improve the level of computer technology application. In today's rapid development of computer network technology, people pay more attention to the improvement of knowledge ability and comprehensive quality level of distance education talents [9].
- Explore learning. Virtual reality technology can virtualize various hypothetical models proposed by students in the learning process and simulate a virtual learning environment through computerized distance learning. Students can conduct experiments in a real laboratory and thus learn about various theoretical knowledge, an approach that is closer to real life and more accessible and understandable. At the same time, it can also improve the ability to obtain information when communicating between teachers and students, providing a more comprehensive and three-dimensional learning environment for students.

- Skills training. The immersive Ness and interactivity of virtual reality brings a new experience to computer distance learning. In the traditional classroom, teachers and students are passive recipients of knowledge, while virtual reality technology liberates learners from the boring classroom environment through interactivity, simulation and digitization. It allows learners to have more autonomy to choose course content and carry out relevant practical activities, and also stimulates learners to participate in the actual operation and interest in the computer network teaching process. Through virtual reality technology, computer distance learning can make full use of the rich resources on the network, so that learners can get more exercise in practice and enable them to better adapt to social life [10].
- Virtual experiment. Using virtual reality technology, you can also establish various virtual laboratories, and can conduct experimental teaching, so that students can learn freely in a real environment, which not only improves the efficiency of the classroom and students' practical ability also enhances the practical application of computer remote technology, but also makes the teaching process more intuitive, so that students can feel the actual practicality while learning, thus enhancing computer remote simulation technology. It can also make the teaching process more intuitive, so that students can feel the actual practice while learning, thus enhancing the computer remote simulation technology.

5 CONCLUSION

With the development of computer technology, distance learning has gradually emerged in people's minds, and it has become a mainstream education mode. However, due to the many drawbacks and defects of the traditional teaching mode and the advantages of speed and efficiency brought by virtual reality technology, people's acceptance of distance learning has gradually increased, making it the mainstream education mode for a long time in the future. Therefore, we have to optimize and upgrade it to adapt to the needs of the new era and explore it. It is very necessary and effective to use the distance learning platform to improve the efficiency and effect of learning, which provides security for computer network, realizes the sharing of information resources and promotes the development of computer network technology; it can also realize the sharing of teaching resources, improve the efficiency of learning and provide students with better independent choices.

REFERENCES

- [1] Shan Bin Wang. Command Ships Driving Simulation System Based on Virtual Reality Technology Teaching Model Research[J]. Applied Mechanics and Materials,2013:25-28.
- [2] Marks Benjy, Thomas Jacqueline. Adoption of virtual reality technology in higher education: An evaluation of five teaching semesters in a purpose-designed laboratory. [J]. Education and information technologies, 2021(2):34-36.
- [3] Heriyanto, Prasetyawan Yanuar Yoga,Krismayani Ika. Distance learning information literacy: Undergraduate students experience distance learning during the COVID-19 setting[J]. Information Development,2021(3):35-37.
- [4] Pei Liu. Application and Teaching Exploration of Virtual Reality Technology in Art Appreciation[J]. International Journal of Learning and Teaching,2021(3):7.

- [5] Hugo Rangel Torrijo. Education in prison: Studying through distance learning[J]. *International Review of Education*,2021(1):44-46.
- [6] Douce Christopher. Editorial: Distance learning and language learning[J]. *Open Learning: The Journal of Open, Distance and e-Learning*,2021:34-36.
- [7] Sanches Marsal. Research Education, Distance Learning, and the COVID-19 Era.[J]. *Academic psychiatry: the journal of the American Association of Directors of Psychiatric Residency Training and the Association for Academic Psychiatry*,2020(2):11-14.
- [8] Pho DucHoa, Nguyen XuanAn, Luong DinhHai, et al. Data on Vietnamese Students' Acceptance of Using VCTs for Distance Learning during the COVID-19 Pandemic[J]. *Data*,2020(3):5-8.
- [9] Pedro Antonio Tamayo, Ana Herrero,Javier Martín, Carolina Navarro, José Manuel Tránchez. Design of a chatbot as a distance learning assistant[J]. *Open Praxis*,2020(1):12-15.
- [10] Wang Yuying. The Influence of Virtual Reality Technology on the Cultivation of Agricultural Students [J]. *MOBILE INFORMATION SYSTEMS*,2021:18-20.