Distance Education System Design Based on VR Live Broadcasting

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Abstract

Since colleges and universities carried out the work of modern distance education, online education has become the latest in the field of higher education, but its development is the fastest. The promotion of online education is the education method of many colleges and universities for students' studies, and in the trend of popularization of higher education in China, it can be built as an indispensable part of the education system. Due to the limitation of the site, the time of the experimental process is shortened, which is not the ability of the experimenter to improve the ability to complete the hands-on operation and apply what he has learned in a short period of time. The virtual platform based on network technology not only creates an opportunity for students to learn, but also allows them to get rid of the harm caused by the experiment, which can be judged according to the situation on the spot, saving the cost of purchase. [13] The virtual reality (VR) industry has gradually developed, because VR can bring users a strong sense of experience, so there is a huge space to play. VR has also made a good response in terms of social entertainment, however, there has been no development in the traditional education industry. After the previous use of projection teaching, there is no strong change. With the improvement of the quality of teaching, the teaching content has also changed accordingly, and what is different from the past is that it is no longer a noisy and tasteless classroom teaching, and it is no longer a teaching method that is bound by laboratories and classrooms. Therefore, virtual reality technology is combined with education and teaching, exploring the esoteric ocean brought by virtual and innovating new learning and teaching methods. The innovation of VR technology in teaching also has a broad space for development. What this article wants to express is an innovative, diverse, developmental and achievable distance education system based on VR live broadcasting. [5]

Keywords: *VR; Live video; Distance education; Virtualization*

1 INTRODUCTION

In order to meet the needs of some different scenarios, the distance learning system based on VR live broadcast provides some ways for our users to use, especially for school LAN users and for users who use the Public Network. [7]

For students in schools, users are mainly concentrated in the classroom. Since VR video has high requirements for network speed, it is difficult to achieve each user watching a high-definition and smooth VR video live broadcast at the same time. In view of this situation, the design of the system has also improved the function of "quasi-live broadcast": the system can install a set-top router in every classroom and even every corner of the school to build a LAN VR resource website platform. Set the background timer function according to the school's class time, and cache the network resources to be held on another day in advance. When the class is officially scheduled, the teacher can act as a host and send VR lesson resources to the students through the multicast mode, so that the repeated update of data and the repeated occupation of broadband can be solved. [12] The structure of the resource system under the LAN is shown in Figure 1.

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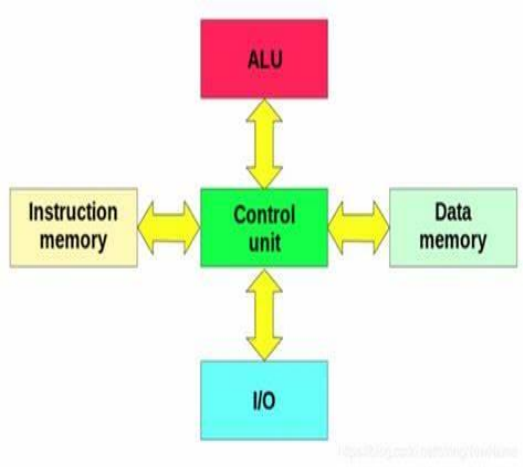

Figure 1: Resource system structure under a local area network

Interaction between teachers and classmates in the classroom is an indispensable and important procedure in teaching. The system uses network communication to achieve interactive functions under the local area network. Teachers can log in through the client and check the learning status and learning progress of different students through the set-top box router. The user's end of the teacher and the user of the student can simulate the state of the class, try to raise their hand in class to answer the question, and the teacher selects a classmate to answer the question in a lottery. The combination of "intended live broadcast" and network communication can naturally carry out smooth VIEWING of VR live broadcast resources, providing a stronger live broadcast experience for LAN users in schools. [10]

Users under the public network mainly log in to browse when they need it. So, in order to distinguish between different users, we set up a "user avatar" for this purpose and experimented with it to ensure that users can use it normally. The system will record the content of the user's operation when using the Public Network, set the browsing history, favorite videos, personal information, etc. as the original data, build a data label after the overall analysis of the original data, and set the user portrait that conforms to these contents according to these data labels. The user's use efficiency is higher, and the user avatar will also highlight these characteristics. [11]

The effective integration of virtual live broadcast technology and classroom makes the original traditional teaching classroom more interesting, makes the original illusory concept become practical, and makes the original distant and untouchable scene become within reach, such technology is enough to promote students' interest in it, and also to stimulate the passion in students' hearts. [6]

2 DESIGN OF THE SYSTEM

2.1 VR Technology

VR virtual reality technology is the use of computers to generate a virtual world that can directly exert visual, auditory and tactile sensations on participants and allow them to observe and manipulate interactively. It uses computers to implement virtual scenes, and through interactive three-dimensional dynamic system simulation integrated with various information resources, allows users to immerse themselves in the virtual world when using them. In the design of this system, the VR presented is mainly from Android mobile phones, connected to Bluetooth for mobile phone viewing, so as to achieve the freedom of VR experience. Through such technology, vr glasses were also invented, in order to achieve the super experience brought to us by VR, VR glasses are equivalent to intelligent eyes, and our eyes achieve the best visual effect through VR glasses. See Figure 2. [15]

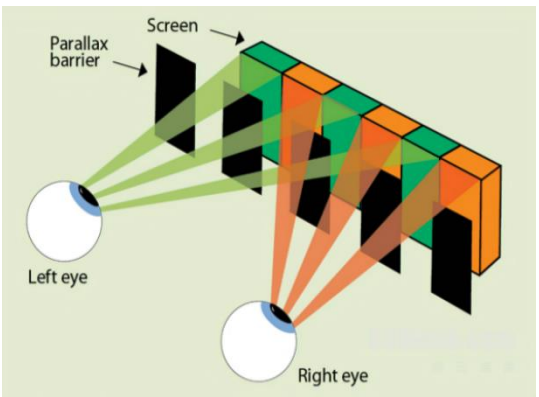

Figure 2: VR virtual simulation technology

2.2 Live Streaming Technology

Live broadcasting is the hottest industry in contemporary times, and various types of live broadcasting appear in our lives. Because live streaming is not restricted, as long as it is possible to broadcast live where there is a network, students can start learning on their own, and the number of participants is not limited. This system integrates VR and live broadcasting with each other, making our teaching live broadcast to interactive live broadcast for conversion. The structural combination of the entire VR live broadcast is shown in Figure 3.

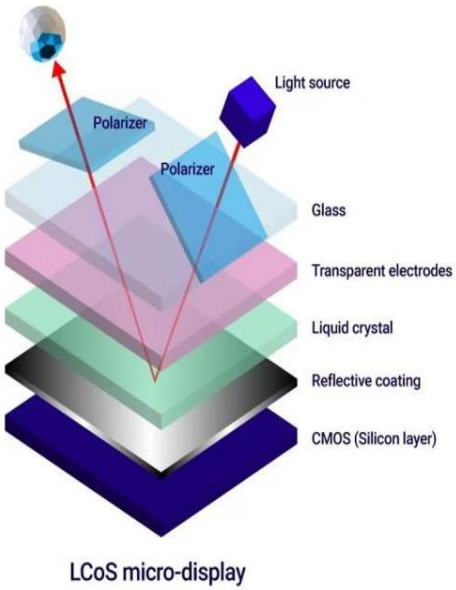

Figure 3: VR live broadcast structure diagram

There is currently some talk about the playback process and storage space, and the VR live streaming source is composed of various teaching systems. In the most popular content distribution network, it relies on the load balancing of the central platform to improve the efficiency and operability of user access. This is a crucial step towards the latency of VR live streaming. This article introduces the concept of "quasi-live broadcast", in fact, in order to more users know it, this new type of live broadcast will make people full of curiosity, so as to improve the efficiency of the use of the platform. This kind of "quasi-live broadcast" is a technical Internet celebrity broadcast course in the contemporary network environment. [4]

2.3 User Portrait

In this era of the Internet, many platforms have appeared live selling, e-commerce will be based on the buyer's personal information for specific labeling, and then use this information for more specific user image, so as to provide buyers with one-on-one intimate service. The user profile will be continuously updated in this process, and will gradually evolve into the basic information used by the current platform to identify the user. This article integrates the classroom program of the mobile phone software with the user portrait, and then carries out the corresponding intelligent service recommendation list according to the basic information of the individual to meet the needs of the user in the case of surfing. [3]

We can understand how user portraits work through the system, and it will be carried out in several ways. When the user uses the APP, the first step is to obtain the user behavior to know the log data, the second step is to obtain the user appointment behavior and then the user can make an appointment log data, the third step is to obtain the user's collection behavior to be able to collect the log data, and the last step is to obtain the user's attention behavior, after which the user can pay attention to the log data. The system builds such a program in order to make it convenient for users to use it, and the construction diagram of the entire user portrait is shown in Figure 4. [14]

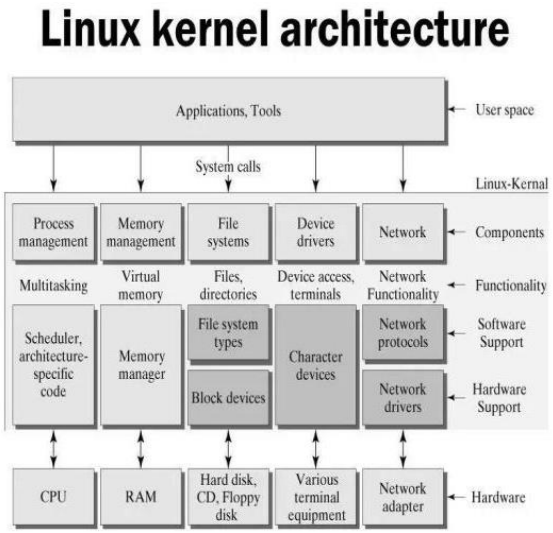

Figure 4: User portrait flowchart

3 SYSTEM TESTING

The system is used in VR teaching, and the network speed in the VR playback function is the most critical step, so it has a profound impact on some functional operations and cache rates carried out in this process. The test is demonstrated by coding tutorials, real-time ledger output, documenting test results, and then taking appropriate values in multiple tests. In different environments, the cache rate of the video is basically the same, the faster the playback speed, but the situation will gradually stabilize later. From the process of using it ourselves, we can know that the video frame rate during playback will basically be around 60 frame values, which is very consistent with our viewing experience and will not make us feel that it is stuck. As can be seen from Figure 5, the probability of the GPU value after playback is stable between 30%.

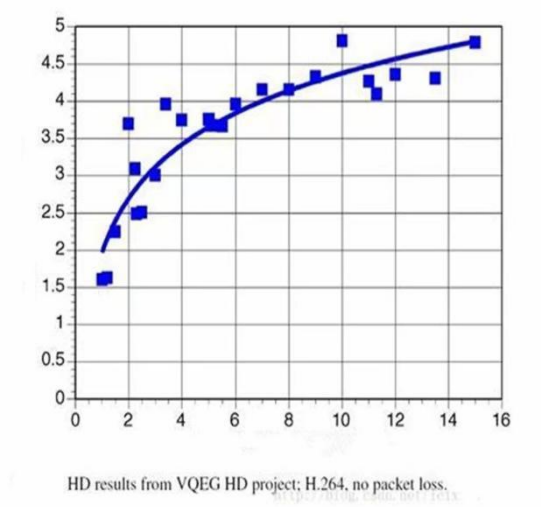

Figure 5: GPU rate after video playback

The test results show that the system in a very normal network, there will be no stutter, not smooth situation, for high-quality VR playback effect, to give users a good viewing experience is basically feasible.

4 MONITORING AND EVALUATION OF DISTANCE EDUCATION

The biggest difficulty of distance education lies in the occurrence of students' learning status and the evaluation of teaching effects. In the distance education teaching, the main factors that interfere with students' learning are social information that is not related to learning, learning network speed and other hardware factors, according to the statistics of some inquiry reports, the attention retention time of college students online learning during the epidemic is about 25 minutes. To "grab" students' attention back in the online live course, it is necessary to make more preparations from the students' learning interest and the choice of teaching content, the teaching effect and evaluation in the teaching process.

4.1 Monitoring of Points of Interest

The core of students' attention is chosen because of interest, if students have no interest in learning content, any opportunity to seize learning is not, no matter the use of mandatory monitoring methods is only to seize their people, can not grasp their hearts. In the process of teaching, for key knowledge points, questionnaires and surveys are used to identify the concerns and points of interest of their results and feedback, so as to adjust the teaching content and teaching methods. If you choose the car model that students like, use VR live broadcast technology to teach distance education and provide rich learning programs. [2]

4.2 "Punch card" real-time control

In addition to regular clock-in and attendance, students will also choose from time to time during the class. Such as specifying individual students to turn on the camera to "punch in"; Every student is required to understand a certain knowledge point, and if it is understood, it is necessary to punch in "888", and if it does not understand, it is required to punch in "111". Criticize students who do not punch in, punch card monitoring is not perfect, but can give students a restraining effect, students will not feel very casual [1].

4.3 Full evaluation of big data

A teaching platform for all the activities of students to participate in will have experience points score, in the teaching process can avoid the teaching activities of the course, so that you can completely record the activities of students to learn has a certain big data analysis ability, through the regular student to record the student's activities and growth process, the degree of participation in learning activities and resource browsing is very necessary, for the performance of students to give praise and encouragement, poor performance is early warning, and timely give the corresponding program. Figure 6 shows a learning analysis graph of a student with low experience value. [8]

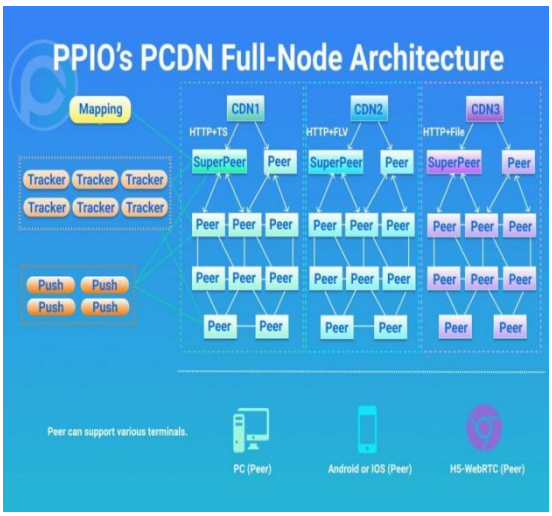

Figure 6: Learning analysis graph

5 CONCLUSION

The design throughout the article is based on a distance learning system based on VR live streaming. By using different experience effects in different scenarios, the use of the "quasi-live broadcast" function on campus can solve the high requirements of some traditional classrooms on our network environment, and it will help us eliminate it. The system will allow every child to use it according to the smooth and ultra-clear VR classroom live broadcast, which can meet the daily commuting

students to watch some videos, and also introduces the "user portrait" technology to provide users with a unique point of their own.

Based on the VR live distance learning system, the VR classroom live teaching will be collaborative, so that teachers and students can get rid of the traditional classroom, no longer need to carry out noisy and fun offline courses, and realize the benefits of online teaching. Every student is immersed in the virtual world of VR, and the teaching system brings students a strong sense of experience, making our knowledge more vivid. This study is of great help to innovative education methods, and will also make the education system more perfect, which is a positive result of the combination of VR live broadcast system and education system.[9]

With the wide application of VR technology in the field of education, if the naked eye 3D effect and the emergence of virtual classrooms, etc., will bring a very influential change to the online live teaching effect. The emergence of resource chains, storage and retrieval under the teaching of VR live distance education will be a major change in the direction of research and improvement of live teaching in the future.

After a semester of online teaching practice during the epidemic, through the big data analysis of classroom statistics for online education, the final scores of students after statistics did not fluctuate greatly compared with the previous ones, and the distribution of grades was within the normal and reasonable range. However, due to the fact that the content of the exam is biased towards theoretical knowledge, despite the virtual simulation training and assessment of practical skills, it is still unable to fully and objectively reflect the real skill level of students. Therefore, for courses with strong practicality, there are still some hidden dangers in online courses, and if you want to fully implement them, you need to be fully prepared and further improved.

The online live teaching platform should vigorously and fully utilize data analysis and VR live broadcast effects to provide teachers and students of colleges and universities with teaching strategies and teaching resource management, and personalized platforms to show it. As far as possible, all platform monitoring of students is registered and tracked, providing rational suggestions and practices for the next step of learning, and effectively achieving meaningful learning and professional guidance.

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REFERENCES

[1] Cui Yansong, Wang Fang, Chen Keliang. Design of distance education system based on VR live broadcast [J]. Experimental Technology and Management, 2020, 37(06): 132-136+140. DOI:10.16791/j.cnki.sjg.2020.06.029.

[2] Gu Xiaomin, Wei Zhihui, Liu Xiaolong. Where is the road to open distance education in the Internet era?—— the driving force and enlightenment of MOOC development[J].Open Education Research, 2015, 21(04):75-80. DOI:10.13966/j.cnki.kfjyyj.2015.04.009.

[3] Han Yi, Feng Yifeng, Fang Mingming. Research on the application of VR technology in the field of online live broadcasting [J]. Western Radio and Television, 2020(13):200-201.

[4] LI Yaoyao, SHAO Ziyun, ZHU Danwen. Taking the World Cup in Russia as an example to analyze the application status and prospect trend of VR in live broadcasting [J]. Contemporary Sports Science and Technology, 2019, 9(15): 233-236. DOI:10.16655/j.cnki.2095-2813.2019.15.233.

[5] Ma Xiaoling, Cao Pan, Xing Wanli, Peng Feiyan, Yang Fei, Wu Yonghe. Distance Education: A New Era of Openness: A Perspective on the 2013 Annual Conference on Distance Education in the United States [J]. Journal of Distance Education, 2014, 32(02): 67-75. DOI:10.15881/j.cnki.cn33-1304/g4.2014.02.009.

[6] Wang Guohua, Yu Shuyu,Huang Huifang,Hu Yan. Visual Analysis of Distance Education Research in China: Core Literature, Hot Topics, Frontiers and Trends [J]. Journal of Distance Education, 2015, 33(01):57-65. DOI: 10.15881/j.cnki.cn33-1304/g4.2015.01.007.

[7] Xiao Jiehua, Fu Zhimin, Wang Lijun, etc. Research on the Application of Social Live Broadcasting of Sports Events Based on 5G+ Cloud VR [C]//. Proceedings of the Symposium on 5G Network Innovation (2020).,2020:416-419. DOI:10.26914/c.cnkihy.2020.017437.

[8] Xu Caixia, Liu Huan, Zou Yangyang. Innovation and Development of VR Technology in News Client Live Broadcasting[J]. News Gathering and Editing, 2019(01):49-50.

[9] Xu Huoshun, Ye Jianzhang, Yin Haisheng. Big Video VR Live BroadcastIng Service and Its Technology [J]. ZTE Technology,2017,23(06):24-27.

[10] Yao Yuan, Han Xibin, Liu Yingqun, Cheng Jiangang. A Comparative Study on the Operation

Mechanism of MOOCs and Distance Education[J]. Journal of Distance Education,2013,31(06):3-10. DOI:10.15881/j.cnki.cn33-1304/g4.2013.06.006.

[11] Ye Jiasheng, Zhu Zulin, Guo Yunjian. Quality Assessment of Modern Distance Education: The Perspective of Learning Input [J]. China Electrochemical Education, 2015(07):60-65.

[12] Zhang Kunying, Wang Jiaojiao, Zhang Jianian." The Impact and Thinking of New Technologies on Distance Education under the Perspective of Internet +[J]. Journal of Distance Education, 2016, 35(02): 82-89. DOI:10.15881/j.cnki.cn33-1304/g4.2016.02.011.

[13] Zhao Hong, Chen Li, Wang Xiaokai, Lin Shiyuan, Zhang Wenmei, Li Shuang. The development context and problem analysis of modern distance education policy[J]. China Distance Education, 2021(08): 12-20+76. DOI:10.13541/j.cnki.chinade.2021.08.002.

[14] Zhu Zulin, Guo Yunjian, Zhu Chencan, Tang Shihua, Bi Lei. 2013 Annual Progress Report on Distance Education Research in China[J]. Journal of Distance Education,2014,32(03):3-12. DOI:10.15881/j.cnki.cn33-1304/g4.2014.03.004.

[15] Zhu Xiaowan, Ding Yi, Peng Xufu, Yan Hui." Analysis on the Application Development of VR Live Broadcast + Education [J]. Journal of Hubei Normal University (Philosophy and Social Sciences Edition), 2018,38(05):142-146.