# Research and Development of Fire Safety System in Higher Vocational College Based on Virtual Reality Technology

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**Abstract:** Based on Vr Technology and Educational Application, This Paper Analyzes the Theoretical Models of Fire Safety Education in Universities and Fire Universities Based on Vr Technology. Secondly, the System Design Principle and Design Idea Are Summarized. the System Elements Such as Education, Interaction, Reliability, Fun and Science Are Made into the System Framework Design Model, and the Development Process is Classified. Secondly, Based on the Random Modeling of 3dmax System, the Function Module of Virtual Reality is Constructed, the Scene Simulation, User Dialogue Training, Data Management and Control Function Are Implemented, and the University Fire Safety Education System Based on Vr Technology is Completed. Finally, the Vr Helmet Based on Htc Vive Hardware Platform is Tested. through the Function Evaluation and Application Effect Analysis, the System Can Effectively Improve the Effectiveness of Fire Safety Education and Education.

## 1. Introduction

In Recent Years, the Frequent Fire Accidents in Universities and Colleges Have Also Occurred in the Huge Property Loss and Sacrifice[1]. It is Very Important to Strengthen the Safety Education of University to Maintain the Normal Order of Campus and Ensure the Safe and Healthy Development of Students. All Students, in Order to Prevent Fire, Need to Understand, Study and Learn Fire Safety Knowledge and Technology. on the Other Hand, When They Should Not Encounter Fire, It is Necessary to Deal with It Properly. However, the Traditional Fire Safety Education Has Some Limitations. Textbook Education and Multimedia Case Teaching Method Are Very Impractical. However, Due to the Limitation of Cost and Other Factors, the Effect of Fire Safety Bit is Not Ideal. the Emergence of Virtual Reality Technology Provides a New Mode for Fire Safety Education. At Present, the Relevant Research At Home and Abroad Mainly Focuses on the Research and Application of Fire-Fighting Plan and Escape Plan. the Developed Vr System Has a Relatively Simple Operation Mode and is Not Practical. Fire Safety Education Based on Virtual Reality Technology Recent Research in Developing Countries Abroad Vr Technology Has Been Applied to Fire Training System and Achieved Good Training Results.

## 2. Research Background

The safety education center in the UK and the scene of fire fighting in huntsworth, in order to use science and technology and computer control for realistic simulation demonstration, and to study the simulation training of fire safety, good results have been obtained 112[2]; in order to build a rapid prototype of the virtual environment for the use of computer game development tools, the original idea of fire proposed by the University of Durham, England, and the demonstration of fire refuge training Used in system development. In addition, it also points out this point from the first person design game system construction.

The computational fluid dynamics software FDS is a new fire protection system developed by

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the Fire Research Institute of the National Institute of standards and Technology (fire mechanics simulator, FDS developed to simulate the motion of fire fluid;) Hampshire “colt” VR technology company[3]. The system can not only provide all-round training solutions for different firefighters in different situations, but also simulate real fire scenes to meet the training needs of different firefighters. Once a major decision error occurs, the scene simulated by the system will “explode”. The current situation of domestic research on fire safety education based on virtual reality technology is late for VR technology in China. In this field, it is concerned by relevant government departments, and relevant VR technology research plans are formulated and implemented. The national economic and social development 13 year plan (2016-2020) planning outline, national high-tech Ramp[4]; D plan and National Natural Science Foundation research projects all include VR technology. In the late 1990s, in the field of fire safety education, many traitors and research fire education and training were used.

Table 1 Knowledge Teaching Content

| Project | Knowledge points | |
|---|---|---|
| Ideological Education | Relevant laws and regulations | Fire safety management system |
| Basic knowledge of fire | Combustible material | Combustion supporting substance |
| Basic knowledge of fire protection | Basic fire prevention knowledge | Common fire hazards |
| Fire alarm | Report to nearby people | Call the fire brigade |
| Fire fighting | Definition, cause and classification of fire | Fire development process |
| Fire prevention | Preventive measures | Find out the fire hazard |
| Fire hazards | Development process of indoor fire | Fire classification |

In China, relevant departments use VR technology to carry out fire planning related investigation and research. For example, Shi Jianong of Tsinghua University and other comprehensive building fire simulation and structural safety analysis systems are designed to analyze the fire safety of Beijing Olympic Stadium. 3D real-time rendering technology is based on the virtual training system engineer of Beijing University of technology. According to the virtual oil depot fire and fire simulation training system Co., Ltd. developed by the fire, the safety engineering technology innovation center on the campus of Jilin State University, the education evaluation system of the safety drilling hole on the campus, a joint research and development group developed. “Set up coaches at the scene of fire to complete the process of disaster prevention and avoidance and achieve the purpose of disaster prevention education and training[5]. In November 2016, No. 119 fire protection promotion month in Fujian Province, a VR safety experience education system for primary school students was developed. Use VR eyewear to experience fire escape and improve self-defense awareness. In conclusion, VR technology has many advantages in learning fire safety knowledge and fire avoidance technology. Generally speaking, in the field of fire safety education at home and abroad, the research and application of scientific fire-fighting plan and refuge plan are still the focus. There are several shortcomings in fire safety education for college students. For example, the above research methods are aimed at fire safety education and lack of effective attraction. Most VR products are still interactive with traditional mouse and keyboard operations. A small part of them use somatosensory interaction technology and VR eyes, but the operation method is not sensitive enough, with weak immersion experience and low recognition accuracy[6]. At the same time, the form of teaching content is relatively simple; most of the systems are desktop VR systems, and immersion VR systems have complex equipment, difficult installation and high cost problems. The evaluation of scientific education is not supported by the relevant educational and teaching theories, but has low practicability and cannot play its due role in the actual educational activities.

## 3. Theoretical Basis of Fire Safety Education in Colleges and Universities Based on Virtual Reality Technology

### 3.1 Application of Virtual Reality Technology in Education

VR is a new industry of millions. VR technology combined with education industry has great

economic and social benefits. The science and Technology Department of Association for science and technology announced the construction of 35 VR science and technology museum projects. VR has a long-term development prospect. Although VR technology can not help teachers to teach more efficiently, it can improve students' learning attention, interest and efficiency, and achieve better learning results.

Skill training. VR's “31” function can dedicate itself to the virtual environment and reproduce the role in the virtual environment. They can understand the operation process of the equipment from multiple perspectives and each round, and learn various skills. For example, training and Simulation in the medical field using VR technology.

Knowledge learning. In order to learn all kinds of knowledge, please refer to the use of VR technology[7]. On the other hand, it is helpful for learners to understand the difficulties of knowledge in the process of learning to simulate the changes of things and natural phenomena that are difficult to observe in the real world. For example, when studying the molecular structure of biological DNA, VR technology can be used to show learners the replication process of DNA molecules, which helps learners learn and understand. On the other hand, VR technology is used to visualize and visualize abstract theories and concepts so that learners can learn easily. For example, when using VR technology to learn the concept of gravity, learners can deepen their understanding of the concept of gravity.

Explore learning. In the process of learning, based on the conjectures using VR technology, various conjectures proposed by learners can be virtualized, so as to verify these results visually[8]. For example, use VR technology to learn circuit and 3D architectural design.

Application of virtual reality technology in fire safety education in Colleges and Universities. VR technology can simulate all the fire-fighting equipment on the computer, as well as the battle scene. VR technology can provide a more practical environment for the teaching of College fire safety education. VR technology applied in University fire safety education has the following advantages.

VR technology, the use of University and University implementation of safety education, but the actual environment of technical training, can not be modified, VR technology use interactive nature, the actual backhand training time is shortened, can improve learning efficiency. At the same time, the visual display of virtual environment can help to be familiar with the learning process, operation methods and various shortcomings in a short time.

### 3.2 Improve Learning Enthusiasm According to Students' Psychological Characteristics

Due to the reasons of academic qualification, psychological characteristics and age, students refuse abstract, conceptual and declarative knowledge in terms of concepts, concepts and principles, and are very interested in practice. VR technology can give people an intuitive feeling. Its realism and interactivity also make the fun of learning fire courses easier.

### 3.3 Safer Learning

The use of VR technology can avoid the danger of actual experiment and operation and reduce the risk of safety in the course of fire protection.

### 3.4 Cost Saving

In fact, in order to achieve the purpose of learning, it is necessary to complete the research of fire fighting technology through repeated training. The use of VR technology can make up for the shortage of College fire training equipment and teachers, reduce equipment consumables and save money.

As a new form of fire safety education, VR technology has unique advantages in college fire safety education. However, the application of VR technology is still facing challenges. First, there is a lack of natural interaction and feedback. Because VR is a brand new technology, many users didn't understand it correctly before[9]. Therefore, in the interaction design of VR products, we should design and guide the benign interaction of users. In addition, in the design and development of products, we should remind users to operate and increase user participation, and also have

appropriate tactile and visual feedback to attract their attention; second, the combination of VR technology and education theory. Related VR, the design and development of educational products cannot be combined with more profound educational teaching theory. The quality of teaching content and teaching methods depends entirely on the understanding and mastery of teaching and guiding content by enterprise designers and developers. As a result, some VR educational products have no actual educational value. Therefore, in the process of design and development of VR products, it is necessary to carry out in-depth education and guidance theory. At the same time, in the design process, we should not only follow these unique principles, but also design according to these principles and theories. Then we can make products that compare with other types.

## 4. Conclusion

Because the amount of movement between virtual environment and real environment depends on the similarity between virtual environment and real environment, it becomes easy to move and move. In the process of modeling, the fire safety education system based on VR technology should focus on improving the realism of virtual scene.

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