The application of virtual reality and augmented reality technology in the field of Education

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Abstract: With the continuous development of modern information technology and the increasing level of science and technology, virtual reality and augmented reality as a new technology have been widely used in many industries, and play a positive role. This paper focuses on the differences and educational characteristics between virtual reality and augmented reality technology, analyzes the application of virtual reality and augmented reality technology in the field of education, and puts forward its own views for reference.

1. INTRODUCTION
In recent years, with the continuous improvement of technology and the integration of technology, Internet plus education has been constantly innovating and changing, and has brought about new pattern changes. The emergence of virtual reality and augmented reality technology has brought new experience and influence to the public's life, work and study, and has further expanded the resources and enhanced the cognitive experience. It is of great practical significance to strengthen the application of virtual reality and augmented reality.

2. RESEARCH CONTENT
A. By describing the characteristics of virtual reality and augmented reality, the connotation and difference between them are analyzed.
B. According to the characteristics of virtual reality and augmented reality, the advantages of them in the field of education are analyzed.
C. Analyze the possibility of the application of virtual reality and augmented reality in the field of education.

3. THE BASIC CONNOTATION OF VIRTUAL REALITY AND AUGMENTED REALITY AND THE DIFFERENCE BETWEEN THEM
Virtual reality refers to a technology that generates a three-dimensional virtual world with the help of computer simulation, so as to provide users with the simulation of vision, hearing, touch and other senses, and then create a real situation. It is a new way for people to visually operate and interact with complex data with the help of computer. It is a comprehensive integration technology, which interacts with computer graphics and human-computer mutual technology, sensor technology, artificial intelligence and other fields are closely related (shown in Figure 1).
Augmented reality is a kind of comprehensive technology which is further upgraded and developed on the basis of virtual reality technology. It mainly integrates computer vision, image processing, graphics, multi-sensor technology and display technology. It uses the virtual information generated by computer to fuse the real environment observed by users, so as to stack the real environment and virtual objects in the same picture face or space enhances user perception and perception experience. It is not an independent technology, closely related to all kinds of information in real life, so as to better mine information and display special scenes (shown in Figure 2).

There are some differences between virtual reality and augmented reality, mainly in technology and application. In terms of technology, both of them rely on the computing technology such as graphics, and realize the established functions through the configuration of processor, helmet display, attitude tracking equipment, auditory system, tactile taste and olfactory feedback system. There are great differences between the two in terms of hardware equipment and development content, the main differences are as follows:

| Enterprise | Equipment | Development Content |
|------------|-----------|---------------------|
| Face book  | Oculus Rift: Immersive VR Head Mounted Display | Story Studio VR Film, Oculus Social Alpha Social Applications |

Figure 1. VR technology

Figure 2. AR technology
In the aspect of application, virtual reality technology mainly focuses on whether the virtual scene can achieve good experience and interaction, and constructs the virtual reality environment of the system according to the application requirements and technical conditions. The image of augmented reality technology usually changes according to the real object, emphasizing the function of restoring human vision, automatically identifying and tracking the object, and finally realizing on the screen through multi-dimensional modeling, scene fusion, and real-time virtual interaction.

4. ANALYSIS OF EDUCATIONAL CHARACTERISTICS OF VIRTUAL REALITY AND AUGMENTED REALITY TECHNOLOGY

Virtual reality and augmented reality technology has great potential and broad prospects in teaching, which is mainly reflected in the advantages of using virtual reality and augmented reality technology to stimulate learning motivation, create learning situation, enhance learning experience, experience psychological immersion, cross the boundaries of time and space, dynamic interaction and cross-border knowledge fusion. The application of virtual reality and augmented reality technology can provide educators with new teaching tools, at the same time, it can stimulate students' interest in learning new knowledge, and let students give out innovative inspiration in hands-on experience. Therefore, the application of virtual reality and augmented reality technology in the education industry is a new leap in the development of educational technology, It creates an environment for autonomous learning, from the traditional teacher centered learning mode to a new learning mode in which students acquire knowledge and skills through new information environment and tools. It is in line with the educational concept of a new round of teaching reform and helps to cultivate students' core qualities. With its unique advantages, virtual reality and augmented reality technology are more and more widely used in the field of education.

As for virtual reality technology, it has been introduced in the United States and other western countries since the 1980s. Many schools have introduced virtual reality technology, which can meet the needs of situational and natural interaction of learning media, thus bringing many rich experiences to learners[1]. First, it has immersion characteristics. The virtual environment can give learners the feeling of immersive experience. It can not only directly control the virtual object, but also feel the changes brought by it, which helps to enhance learning interest. Second, it has the characteristics of imagination. Through qualitative and quantitative learning, it can give learners more rational and perceptual knowledge, so as to stimulate innovation ability, display abstract objects more intuitively and vividly, and enhance the level of understanding and memory[2]. Third, it has interactive characteristics. With
the help of a variety of sensor devices, through the realization of visual operation, it can strengthen interpersonal communication, so as to better help learners reduce the learning burden and improve the learning progress (shown in Figure 3).

Figure 3. VR technology help learners

The main characteristics of augmented reality technology in education are as follows: first, it has the characteristics of interest, and can carry out a variety of visual presentation, so as to show the learning content more vividly, and improve the learning interest with the help of games and other ways. Second, it has the characteristics of intelligence. By providing intelligent guidance, relying on big data, cloud computing technology and other support, it can bring more push related information for learners in learning, improve the richness of learning resources, and broaden learning horizons. Third, it has the characteristics of autonomy, wider learning channels, and increasingly diversified learning platforms. Through the creation of rich learning scenes, it further makes up for the defects of multimedia technology and helps to promote the marginal benefit of learning.

5. APPLICATION AND SUGGESTION OF VIRTUAL REALITY AND AUGMENTED REALITY TECHNOLOGY IN EDUCATION

With its unique advantages, virtual reality and augmented reality technology can better integrate with all aspects of content and resources in the field of education, so as to better improve the application value and play its due functions. The application in the field of education is mainly reflected in the following aspects:

5.1. It can realize hardware customization

With the deepening of the reform of education system, the concept of quality education puts forward new requirements for education in the new era. Only with more perfect hardware system and synchronous development of hardware technology and education content, can we better improve the era of education. Virtual reality and augmented reality technology can realize synchronous development with educational content, so as to better combine creativity and practice. In the process of specific development and integration, it should be noted that, on the one hand, it should be effectively related to the trend of technology development, more special learning devices should be configured or special learning functions should be added to general devices, so that the chips of learning devices can be tracked in time, and the computing ability, analysis ability and adaptive integration level can be improved. It can also reduce the dizziness with the help of AMOLED equipment (This contrast is shown in Figure 4), enhance the intelligent display effect such as micro projection, and introduce the experience of intelligent robot. On the other hand, it is necessary to adapt to the functions of the technical system, upgrade and optimize the existing learning support system, integrate information
synchronization technology, data conversion technology, etc., so as to bring more real and rich learning expression for learners and better reflect the human-computer interaction function. At the same time, it should be connected with the actual development of teaching, and the corresponding educational equipment and technical tools should be continuously upgraded and effectively integrated with the educational curriculum design, so as to better meet the expectations of learners.

![Figure 4. AMOLED reduce the dizziness](image)

5.2. Improve the level of content visualization

The application of virtual reality and augmented reality technology can bring learners full perceptual experience such as vision, hearing, touch, smell, etc. In the aspect of visualization, it needs to be continuously improved and optimized. In the aspect of media demonstration, it needs to pay more attention to the needs of learners, keep upgrading and updating. In the aspect of logic structure program, it needs to constantly enhance the characteristics of interest development, and in the aspect of presentation form keep upgrading [3]. A variety of devices can be used to realize immersive and experiential teaching, including: head mounted virtual reality device, which generally includes head mounted display, position tracker, data glove and other devices, which are divided into mobile virtual reality helmet and split virtual reality helmet; desktop virtual reality and augmented reality equipment, the representative product of which is zSpace of the United States The company's virtual reality education all-in-one machine has been used in the United States since 2013, and now the zSpace Z300 is the third-generation product; handheld augmented reality devices, which mostly use the combination of mobile devices and app software. The above equipment can make students have immersive feeling of being in the real situation. It can give students an excellent real experience and make the contents of books touch, interact and feel.

5.3. Further improve the level of environmental virtualization

On the one hand, we need to constantly improve the level of interactive technical support, create a more diverse learning environment. On the other hand, we need to provide more personalized customization for self learners, so as to satisfy the needs of autonomous learning. We should further develop virtual knowledge assistant in communication and interaction, thus enhancing reinforcement learning participation and cooperation.

5.4. It emphasizes the real and rich experience

Teachers should make full use of modern technology, strengthen the relationship between teaching content and real life, build a diversified learning classroom, and students should also change their roles, improve their awareness of independent learning, improve their media literacy and digital literacy, so as to better improve learning effectiveness.
6. **KEY TECHNOLOGY SUPPORT FOR VIRTUAL REALITY**

6.1. **Dynamic environment modeling**
With the development of dynamic environment modeling technology, the data in real environment is more and more complete, which provides a more realistic and reliable virtual visual environment model for different applications.

6.2. **Real time 3D graphics generation technology**
The generation technology of 3D graphics has been relatively mature, at least the refresh rate of graphics should not be less than 15 frames / second, and it is better to be higher than 30 frames / second. Improving the refresh rate is the main content of this technology.

6.3. **Stereoscopic display and sensor technology**
The interactive ability of virtual reality depends on the development of 3D display and sensor technology. In the past, 3D display has the disadvantages of heavy equipment, low resolution, large delay, low tracking accuracy, insufficient field of view, easy fatigue of glasses and so on. Therefore, it is necessary to develop new 3D display technology [4].

6.4. **Application system development tools**
The key of virtual reality is to find the suitable occasion and object, that is, how to exert imagination and creativity. Selecting appropriate application objects can greatly improve production efficiency, reduce labor intensity and improve product quality.

6.5. **System integration technology**
Because VR system contains a lot of perceptual information and models, system integration technology plays an important role. Integration technology includes information synchronization technology, model calibration technology, data conversion technology, data management model, identification and synthesis technology and so on.

In a word, the hardware includes: tracking system: determining the position of participants' head, foot and trunk; tactile system: providing feedback of force and pressure; audio system: providing stereo source and determining spatial position; image generation and display system: generating spatial image and vertical display; High performance computer processing system: it has the characteristics of high processing speed, large storage capacity and strong networking. In terms of software, it can receive the information from high-performance sensors and track information from helmets, generate stereoscopic display graphics and render virtual environment in real time [5]. It can provide an integrated environment for calling and interconnecting various databases and CAD software.

7. **CONCLUSION**
With the continuous upgrading of virtual reality and augmented reality technology, it will be more widely used in education and other fields in the future. By building a diversified learning ecosystem, it will help to further improve teaching effectiveness and promote the continuous improvement of learners' comprehensive quality. Virtual reality and augmented reality technology not only provides a technical platform or tool for teachers and students, but also develops a new teaching mode and teaching method. The wide application of virtual reality and augmented reality technology in classroom teaching is of great significance to the development of future school and the idea of smart classroom reform. Virtual reality and augmented reality technology can integrate virtual and real environment, bring better learning experience to students through interaction, provide students with a new learning media and learning ideas, and promote students' autonomous learning and innovative learning in a good state. Taking virtual reality and augmented reality technology as the carrier of education can enable students to improve their core literacy through independent exploration, cross-border integration, team cooperation and innovation. The perfect combination of virtual reality and augmented reality
technology and education will make great contributions to opening up the road of educational innovation in the future.

ACKNOWLEDGMENTS
Thank my doctoral supervisor, Mr. Guo Lujun, for his suggestions and support for my thesis. He has an important influence on my research direction and research methods, and my progress cannot be separated from his guidance. This paper is based on the Key projects of Art Science in Shandong Province: "Study on the reference factors of Shandong animation industry to the development characteristics of Korean Animation Industry in the context of cross-cultural communication" project research.

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