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Research Article

Application of Virtual Reality Technology in Film and Television Animation Based on Artificial Intelligence Background

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The application of artificial intelligence technology in the film and television field has profoundly changed the content and production methods of television programs and promoted the development and production of a new generation of artificial intelligence television. The popularization of artificial intelligence technology is conducive to improving the quality of television program content, innovating content categories, reducing television program production cost, and improving production efficiency. Due to the popularization and the use of virtual reality (VR) technology in scientific research and social life, the application of VR technology has been studied from the perspective of film and television animation (FTA) teaching, hoping to promote the development of FTA education. First, the existing dynamic environment modeling technology, real-time three-dimensional (3D) graphic generation technology, stereoscopic display, and sensor technology and other VR technologies are combined to carry out teaching design. In view of the current situation of the teaching process of FTA major, the research on these four aspects has been carried out. VR technology is used as an auxiliary teaching tool to complete the basic course teaching of FTA; the 3D animation course and VR technology are combined to improve the teaching effect of professional skill courses. Then, in the application effect, classroom satisfaction, comprehensive quality evaluation, and professional core curriculum effect are compared and analyzed. The results show that the students' comprehensive quality evaluation in VR technology group is significantly improved, and the satisfaction of classroom atmosphere, teaching mode, and teaching facilities are 75%, 61%, and 81%, respectively. The students in this group can better integrate the new design method into the animation modeling and complete the course design task with high quality. Compared with the traditional teaching mode, the students' satisfaction is higher and the harvest is greater. Therefore, the use of VR technology in FTA teaching can stimulate students' interest in learning, improve learning efficiency, and promote the mastery of professional knowledge and skills. The application mode and effect analysis of the proposed VR technology provide a reference for the application of VR technology in FTA teaching.

1. Introduction

The concept of educational informatization was put forward when the information superhighway was constructed in the 1990s. Since the late 1990s, network technology was quickly popular with the Chinese, the whole society's development has been closely related to information technology, and people care about the influence of information technology on social development. In connection with the reform and development of education, the term "educational informatization" also appears [1–3]. Educational informatization promotes education equality and justice, reduces regional differences, and improves education quality. Meanwhile, the emergence of virtual reality (VR) technology is in line with the trend of information development. It provides important technical support for building a learning society with national, autonomous, lifelong, and fragmented learning and forming a perfect modern national education system. The integration of VR technology in education and teaching activities also provides a flexible and vivid interactive form for classroom teaching and plays an important role in innovative teaching mode.

2016 is known as the "first year of VR," and VR technology is popular all over the world. The rapid development and popularization of VR technology have brought a new audience experience and form of expression to the

animation industry, which also makes people pay attention to the powerful influence of the VR technology wave. There is no doubt that the development of the animation industry is the most closely related to science and technology among all the specialties in the art category. The continuous updating of technology promotes the continuous updating of the expression forms of the animation industry, making it have unlimited possibilities [4–7]. In the teaching activities of film and television animation (FTA) major, if VR technology is properly introduced, it will not only play a prominent role in improving the education mode, teaching means, and teaching facilities but also play a significant role in enhancing students' interest in learning, promoting them to explore professional knowledge and skills, and enhancing the professional teaching effect. In addition, education is the foundation of a country and a symbol of national prosperity. The proposal and implementation of the strategy of "develop the country through science and education" also reflect the importance of education to national development. How to apply VR technology to the teaching practice of FTA major in colleges and universities and achieve good results is an important problem that cannot be avoided and must be solved in the teaching practice of college education [8–10]. The head-mounted VR display device is used, which generally includes display module, position tracking module, data sensing glove, and other devices. Generally, there are two kinds of VR glasses: the VR glasses with independent display and the split VR glasses that need to be embedded in the mobile phone.

On the basis of exploring and analyzing the application of VR technology in FTA major and the teaching system of FTA teaching, the role of VR technology as a teaching tool for FTA major in the teaching of professional courses is mainly studied. In addition, a questionnaire survey is used to test its effect on teaching before and after application. According to the survey results, effective countermeasures and suggestions are put forward to ensure that VR technology can better serve the teaching of FTA major. At the same time, it also provides a reference for the practical application of VR technology in professional teaching.

2. Related Work

2.1. Foreign Researches. In terms of exploration in the field of home medical devices, Dhiman et al. considered the utilization of VR technology in the design of home medical devices on the basis of finding that stroke causes adult disability, to research and design a novel, multimodal, VR-based, and performance-sensitive rehabilitation training platform. A low-cost, family-oriented, and personalized medical rehabilitation platform was created, which made an important contribution to the development of the medical industry [11]. In the field of classroom education and teaching, Lamb et al. studied the emerging teaching methods based on the implementation of the Next Generation Science Standard (NGSS). The traditional teaching method was compared with the immersion teaching mode, and then, the immersion teaching mode was applied to the teaching of specific majors for analysis and research. It is concluded that immersion teaching is easier to impart knowledge and skills in abstract teaching, which provides a reference for the application research of VR technology [12]. In addition, industry experts claimed that the progress of VR technology boosts the use of VR technology in naval training and the growth demand of many companies for their products and services. Cowan mainly discussed the rise of VR training in the military field and found that the application of this technology can make the crew familiar with the ship environment and simple control methods before the ship trial operation. The discovery of this theory has made a great contribution to the optimization of ship crew training mode [13].

For a long time, VR technology has been popular in the field of education in the United States. The research and application of this technology even started in 1994. At that time, the University of Washington and Western House Science Foundation developed a special teaching plan-mobile teaching plan. In the plan, a mobile car with built-in virtual devices is proposed to provide related teaching services. In fact, the original intention of the activity is to stimulate students' interest in learning through more intuitive teaching activities and promote the effective improvement of their comprehension ability.

2.2. Domestic Researches. Xiao mainly studied the internal relationship between three-dimensional (3D) animation and VR technology and found that the establishment of 3D model of virtual world in VR system is very similar to the process of 3D animation produced by computer. It is concluded that VR technology is the further development and innovation of 3D animation technology. This conclusion also plays a great role in promoting the healthy development of 3D animation production industry [14].

In addition, Chinese scholars have also done a lot of research on the application of VR technology in other fields. Bing studied and discussed the typical utilization of VR technology in power system. The application of VR technology in various systems of power system was analyzed. The analysis shows that the typical application of VR technology in power system has become an important decision-making tool for power enterprises. VR technology has become an efficient and intelligent operation tool in power enterprises, has strengthened the management and control ability in safety production in the power system, and has enhanced the security protection for power enterprises. In addition, the progress of science and technology in recent years has also promoted the development of animation industry. However, some problems have also been exposed in the development, such as outdated teaching methods, poor teaching effect, and many teaching contents that are inconsistent with the current animation industry [15]. Based on this, Wei Peng believed that 3D VR technology and animation teaching should be better integrated, so that students can get more real experience by putting themselves in the environment of VR combination, and the teaching technology support and teaching resources can be improved, which can improve the quality of animation teaching and contribute talents for the development of China's animation industry [16].

There are few cases of using VR device in the classroom in domestic colleges and universities. For example, Tsinghua University, Beihang University, Shanghai Jiao Tong University, and a few other schools have established VR technology laboratories in the campus, mainly for scientific research and technological development. Tsinghua University has added VR-related introduction content to the basic computer course to show students the latest achievements of VR technology and make technical preparation for future VR research. It proves that domestic VR education is still in the stage of understanding the concept, and there is still a distance from large-scale development and research.

2.3. A Summary of Foreign and Domestic Researches. In short, in foreign countries, VR technology continues to break through and innovate in the film and entertainment industry, but there is still no large-scale promotion in the field of education. In China, the utilization of VR technology in the field of education is mainly reflected in scientific research and technological development, and there are few cases of VR equipment application in the classroom. In China, with the continuous maturity of technology, VR space art is a new art language form combining sculpture, painting, image, and other media. VR has a wide range of applications, but it is still in the exploration stage. VR technology involves electronic technology, and it needs the application of visual perception, physiology, psychology, ergonomics, and other disciplines. To upgrade VR from the technical level to the artistic level, its research and practical application in the field of art are an urgent need to explore, which is explored mainly from the following aspects:

(1) Dynamic environment modeling technology: building virtual environment is the core step in VR technology. The 3D data of the actual environment can be obtained using dynamic environment modeling technology, and then, the corresponding virtual environment model can be set on the basis of the 3D data [17]. Management software computer-aided design technology (regular environment) can be used for 3D data acquisition, while noncontact visual modeling technology is needed in more environments. The organic combination of the two can effectively improve the efficiency of data acquisition.

On this basis, the modeling method based on graphics must be mentioned. There are many kinds of graphic-based modeling methods. For example, the model can be generated interactively in 3D design software directly, or modeling tools of trees and vegetation can be generated using programming languages (such as the development language of 3D design software) according to parametric mathematical methods (such as particle system and iterated function system) [18, 19]. In addition, there are image-based modeling methods. In general, there are two types of textures. One is color texture, which is the surface details reflected by the change in color or brightness. The other is geometric texture, which is represented by small irregular bumps. The main method to generate color texture is texture mapping technology. Its principle is to define the texture pattern in a plane area (texture space) and then establish the corresponding relationship between the points on the object surface and the points in the texture space. The commonly used texture definition method is a discrete method, which uses a two-dimensional array to define character bitmap, various graphics, and digital images.

(2) Real-time 3D graphic generation technology: this technology is mature, and realizing "real-time" generation is quite essential. The real time can be achieved when the refresh rate of graphics is equal to or more than 15 frames/s, and it is better to be higher than 30 frames/s. Without reducing the quality and complexity of graphics, improving the refresh rate is the research content of this technology.

(3) Stereoscopic display and sensor technology: the VR's interactive ability relies on the stereoscopic display and sensor technology development. The existing VR cannot meet the needs of the system. For example, the data glove has the deficiencies of large delay, low resolution, small scope of action, inconvenient use, etc.; the tracking accuracy and tracking range of VR equipment need to be improved, so it is necessary to develop new stereoscopic display technology. Among them, stereoscopic display technology, also known as VR technology, is an advanced human-computer interface based on immersion, interactivity, and imagination. Computer science, simulation technology, AI technology, computer network technology, and multi-sensor technology are comprehensively used to simulate the functions of human visual, auditory, tactile, and other sensory organs, so that people can immerse themselves in the computer-generated virtual realm and interact with them in real time by natural ways such as language and gesture. A humanized multidimensional information space has been created [20]. VR is a kind of computer system that can create and experience virtual world. 3D stereoscopic display technology is a more complex and essential technology in visual display technology. At the same time, it is also a significant supporting technology of VR. Among them, the naked eye 3D stereoscopic display technology is the latest and cutting-edge high tech in the imaging industry. It changes the visual fatigue brought by traditional plane images, which is a technological revolution in the field of image production and a qualitative change. It attracts people's attention with new and special expression techniques, strong visual impact, and good and beautiful environmental appeal [21–23].

Figure 1 is the specific classification of key technologies of VR technology.

At present, VR technology is continually being perfected and improved. The future development trend of this field is expected to include the following five aspects: the development of hardware technology, the development of development platform VR technology, the development of collaborative distributed VR technology, the development of visual regional network technology, and the development of multi-perception ability. In the future, VR technology will also be combined with the key areas (such as education industry) of many countries, which will shine brilliantly in the integration of industries.

3. Method

3.1. Application Effect Evaluation

3.1.1. Research Object

Group A (control group): 42 students in class A of FTA major are taught by traditional FTA teaching method

Group B (experimental group): 40 students in class B of FTA major are taught by VR technology in FTA teaching

3.1.2. Research Methods. In this evaluation, three methods are mainly adopted for a comprehensive evaluation, including satisfaction evaluation, comprehensive quality evaluation, and teaching effect analysis of professional core courses. Among them, the questionnaire is distributed and recovered on the spot. A total of 82 questionnaires are distributed. There is no extreme or missing questionnaire, and the recovery rate is 100%. The comprehensive quality evaluation includes four aspects: daily behavior, excellent rate of professional courses, social practice, and professional skill competition. In addition, the teaching effect analysis of professional courses focuses on the comprehensive design ability of the students in two groups.

Most of the U1 interface resources of the existing VR/AR content are still from the computer version, which is not redesigned according to the VR display device, resulting in the display effect that is not coordinated and unified, which is a common problem of the existing VR/AR display effect experience.

3.2. VR Technology into the Curriculum System of FTA Teaching. VR technology is a highly integrated technology of humans and computer. It can not only simulate the real world but also let users break through time and space to experience the reality of objective reality and even feel the scenes that cannot be experienced in the real world. The traditional classroom teaching mode of FTA major needs the support and participation of new technology, to promote the professional reform, innovation, and development. Therefore, in the process of professional curriculum setting, people are committed to introducing the VR technology into the existing FTA curriculum system, including five teaching systems (art foundation, two-dimensional animation production, 3D animation production, four-dimensional animation (film and television later stage), and comprehensive practice and training). VR technology is mainly used in the 3D animation curriculum system and forms a connecting link between the preceding and the following. When students use VR glasses for experiential learning, they have the immersive feeling of being in the real situation, which makes the knowledge in books become 3D, touching, interactive, and perceptible. Figure 2 is the existing FTA teaching course system.

3.3. Application Design of VR Technology in FTA Teaching

3.3.1. Application Design Ideas. First, it is necessary to grasp the application focus and the desired effect and vivid teaching content. The divergence of students' thinking is not natural, but formed and developed in the process of education. FTA teaching is mainly about the cultivation of visual thinking. In the view of visual thinking theory, vision and thinking are unified. Vision is not passively accepting the description of things, but generalizing abstract things according to personal subjective consciousness. Therefore, it is very important to improve students' knowledge organization ability and promote students' sense making. Then, it is necessary to combine the characteristics of the curriculum system and the demand of market posts to highlight the skills, practicality, usefulness, and professionalism of teaching content design.

3.3.2. Application Design Planning. VR technology is fully combined with basic courses, professional skill courses, and practical training courses of FTA major, forming the existing comprehensive application system. First, VR technology can be used as an auxiliary tool in professional basic courses to enrich teaching forms and stimulate students' interest. Then, its application in animation professional skill courses mainly includes the following points. According to the curriculum standards of professional skill courses, teachers determine students' skill requirements; teachers create simulation skill training environment by VR technology according to students' skill requirements; teachers organize students to use VR equipment to carry out related professional skill training; and teachers design specific training projects according to professional skills, inspire students to think independently, and find solutions to problems in specific projects, complete projects, and improve professional skills. Finally, in the comprehensive training course, due to the strong practicality of FTA major, it is very important to create real enterprise production process and enterprise environment for students as much as possible in the teaching process. Taking the virtual practice training project as the main line and constantly improving the teaching organization line are of great significance to improve the students' comprehensive quality ability and practical operation ability.

On the one hand, VR technology is used as an auxiliary teaching method in professional basic courses. The 3D curriculum and VR technology are effectively combined and

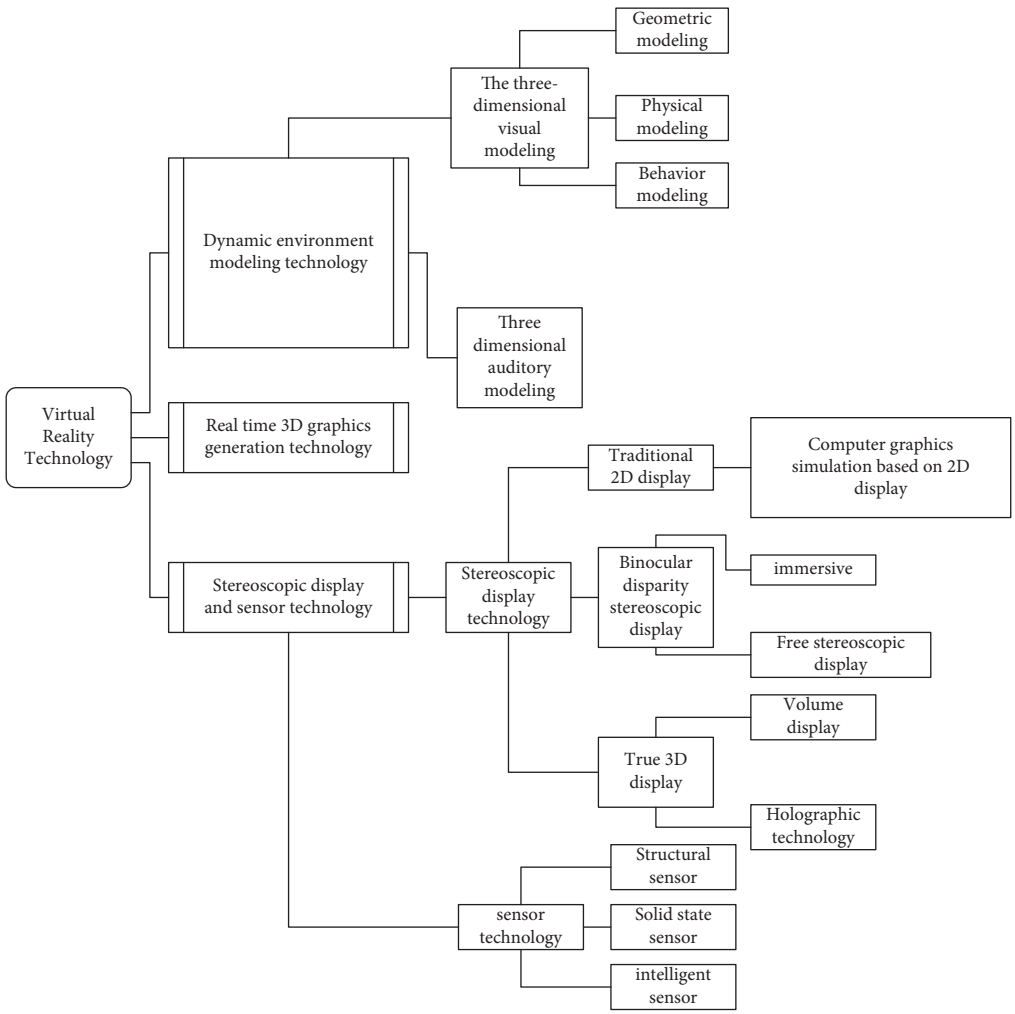

Figure 1: Key technologies of VR technology.

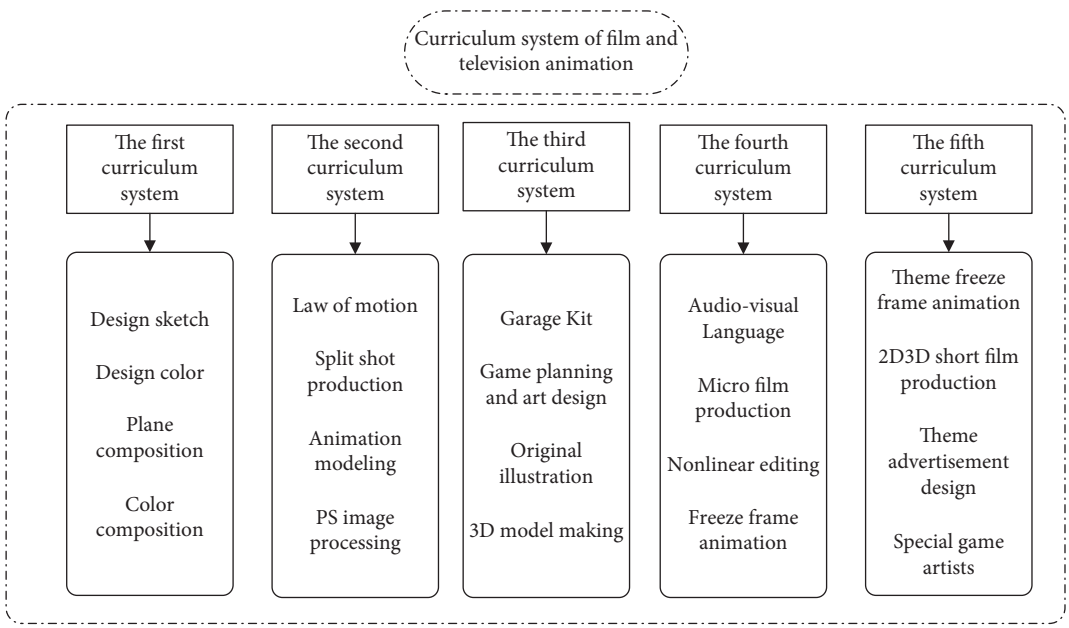

Figure 2: Curriculum system of FTA.

applied to professional skill courses. On the other hand, the school-enterprise cooperation, enterprise docking, and other projects are brought into practice and training, and the project is decomposed into several tasks, so as to realize the comprehensive application of the curriculum system of FTA.

VR/AR technology can achieve a variety of sensory integration of perception effect, real situational experience, travel across time and space, and media interaction feeling and can make students like immersive in the ocean of knowledge. The real scene not only stimulates students' learning motivation but also creates opportunities for learners to observe and operate, which plays a very important role in accelerating the process of knowledge processing and construction. Visualization is beneficial to learners' deep understanding. As for the traditional way of learning, students need to face the text and to imagine history, space, or geography. They cannot give full play to the image of thinking and forget the knowledge learned soon. In VR/AR technology teaching, there are vivid scenes, novel ways, rich content, and interesting interaction, which make interest become the teacher of students.

4. Results and Discussion

4.1. Satisfaction Evaluation. A questionnaire survey is mainly used for satisfaction evaluation, and Figure 3 shows the specific evaluation results. According to the survey, in group A, students' satisfaction with classroom atmosphere, teaching methods, and teaching facilities are 29%, 6%, and 30%, respectively. The students in group B are generally satisfied with the classroom teaching combined with VR technology, with 75%, 61%, and 81% satisfaction with classroom atmosphere, teaching methods, and teaching facilities, respectively. The survey results show that the traditional FTA teaching has been unable to do the best in teaching, and the teaching combined with VR technology plays an important role in stimulating students' learning interest and improving teaching quality.

4.2. Comprehensive Quality Evaluation. The way of group scoring is adopted in the comprehensive quality evaluation, and the evaluation contents mainly include daily behavior, excellent rate of professional courses, participation in social practice, and awards of professional skill competition. The members of the evaluation group are composed of the head teachers, the professional class teacher group, the monitors of the two groups, the students in charge of studies of the class, and five outstanding student representatives. Among them, daily behavior includes attendance, class status, learning interest, and daily homework completion. Figures 4 and 5 show the specific evaluation results.

In the above evaluation standards, attendance and interest are scored according to the percentage of reaching the standard; the excellent rate is scored according to the "percentage + corresponding score"; the social practice and award situation are given 2–4 points each time according to the performance of each participant, and then, the total score is calculated. The above effect analysis shows that the

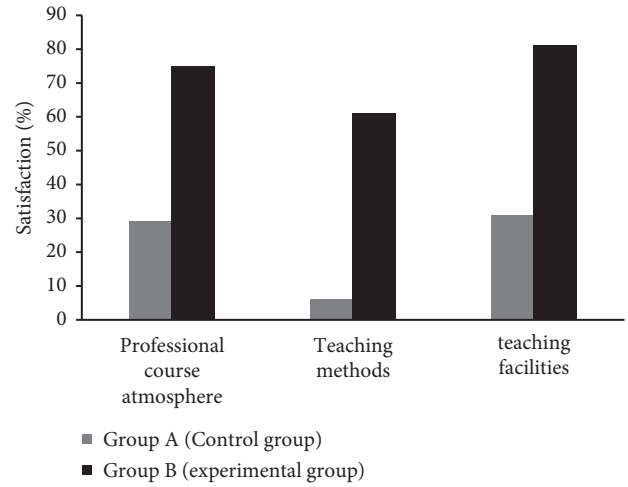

Figure 3: Course satisfaction.

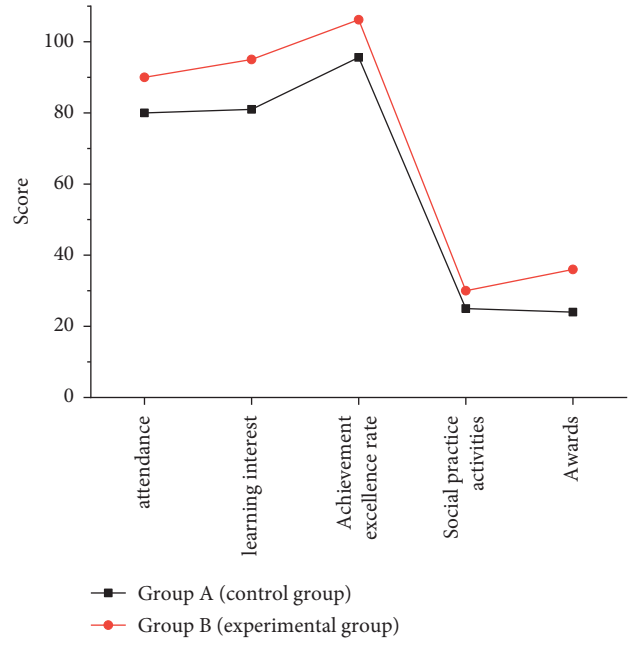

Figure 4: Comprehensive quality evaluation.

performance of each evaluation content of students in group B is better than that in group A, which also shows that the integration of VR technology has played a significant role in the teaching effect.

4.3. Teaching Effect of Professional Core Courses. Figure 6 is the teaching effect analysis of professional core courses. In the course of *animation modeling*, in the task of role richness and material processing, the main design of animation modeling mainly includes four aspects: basic composition ability, headwear and props, clothing (including clothing material), and color matching. In the learning process of basic art courses, students have a good grasp of the basic composition ability. The other four aspects of learning content are the focus and difficulty of FTA modeling course. The comparison of the course results of the two groups of students shows that the students in

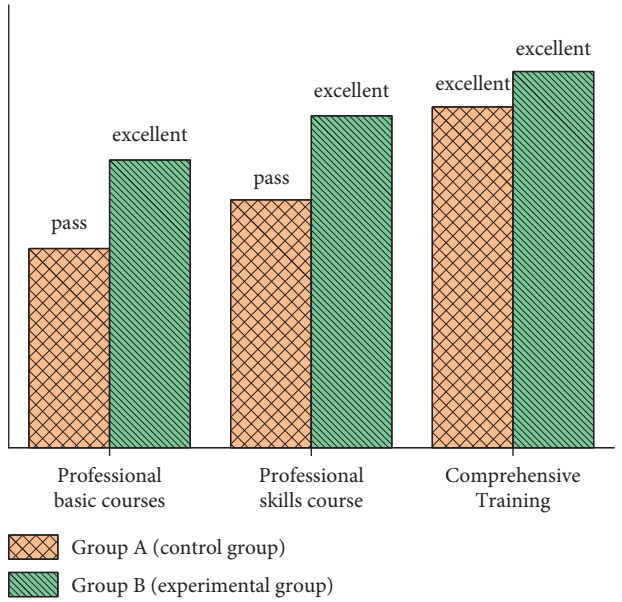

Figure 5: Comparative analysis of two groups of various courses.

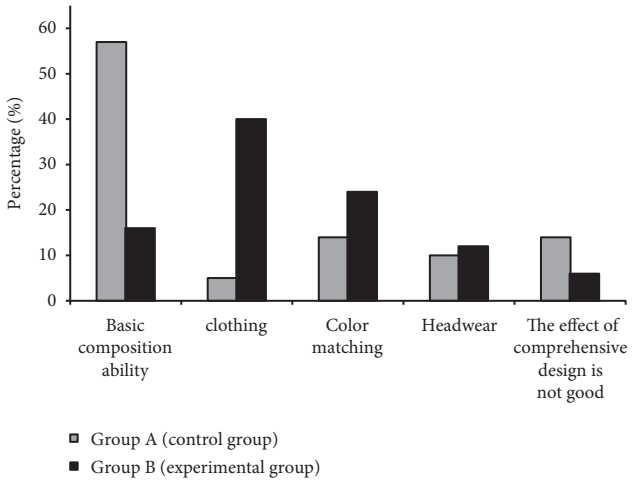

Figure 6: Analysis on teaching effect of professional core courses.

group A are still drawing with the knowledge they learned before, and they do not integrate other design methods into the design, while the students in group B better integrate the new design methods into the animation modeling and complete the course design task with high quality. After the comprehensive evaluation of professional teachers, the proportion of poor design works of group A students is 14%, while that of group B is only 6%.

If VR/AR technology is used to spread knowledge content, the 3D effect of space and the presentation of interactive form can change this situation. Text knowledge can be displayed in 3D visualization, and things previously imagined can be presented intuitively. The real scenes can help students understand and remember knowledge.

Through two kinds of classroom satisfaction questionnaire survey, two classes of comprehensive quality evaluation, and two kinds of professional core course teaching effect comparison, the teaching implementation effect of VR technology in the FTA major is studied comprehensively, and the following conclusions are drawn. First, using VR technology to carry out animation teaching can promote students to understand and absorb relevant knowledge and improve learning efficiency. Among them, group B students have higher satisfaction, higher interest, and greater harvest. The satisfaction and harvest of group A students with traditional teaching are lower and less. In addition, it also shows that the design of teaching framework based on VR technology is reasonable and feasible, which can promote the development of teaching. On the whole, the promotion effect of VR technology on learners' learning effect is worthy of affirmation. At the same time, the application of VR technology has also played a great role in promoting the growth of professional teachers and prompting teachers to actively improve their modern education technology level, to achieve the purpose of teaching benefits of teachers and students.

5. Conclusions

As a representative of modern information technology, VR technology has achieved rapid development and plays an increasingly important role in many fields. As an advanced representative of modern education technology, VR technology has a great impact on the traditional education concept and teaching mode and has caused great changes in the field of education and teaching. The main research content is the practical application research of VR technology in the teaching of FTA major. Based on the development foundation of VR technology and the current development status of FTA professional curriculum system, the role of VR technology in promoting the training of animation professionals is analyzed. From the perspective of the effect of professional curriculum reform, it overcomes the characteristics of profound theory and strong abstraction; by creating simulation skill training scene, it decomposes and displays skill operation content comprehensively and delicately; it overcomes the constraints of weather and airbag factors in the past and carries out the training project perfectly, with obvious effect. From the realization of professional talent training objectives, the application of VR technology can promote the training of highly skilled applied talents to adapt to the market development and demand of animation industry. In the future, VR technology has broad development space and strong market potential, which will have a greater and far-reaching impact on human production and lifestyle, and constantly refresh human's understanding of the world.

Data Availability

The datasets used and/or analyzed during this study are available from the corresponding author on reasonable request.

Conflicts of Interest

The authors declares no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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