





Using CAD Virtual Reality Technology to Optimize the Communication and Presentation of TV Media

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Abstract. With the rapid development of science and technology, Internet technology has brought about a technological revolution in the underlying technology. All the laws of the traditional industrial age will be reinvented. The traditional TV media needs to survive and develop in the new world of the future, which is the primary problem that all TV industry practitioners need to think about and face. New technology brings huge impact of the times. New technologies also bring new opportunities for traditional TV media. Virtual reality technology has produced creative applications in the field of television. Virtual reality technology has opened the door to a new world for television media. Not only innovation and change at the technical level, but also great changes in program planning, design and production concepts. The application of virtual reality technology in TV media can be roughly divided into two parts, one is the mature virtual studio technology. This paper makes a theoretical analysis of the virtual reality technology in the direction of TV media application. This article analyzes and compares the roles and different positioning of virtual reality technology in different types of TV programs. The article further draws the application value of virtual reality technology in TV media. On this basis, the article will further explore the development trend of TV media in the future and provide services for the majority of practitioners.

Keywords: Virtual reality technology; virtual studio; TV media communication; CAD computer technology

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1 INTRODUCTION

In 1965, Gordon Moore, the founder of Intel, proposed the famous Moore's Law. The theorem states that computer performance doubles every 18 months. Half a century later, the law is still working its way. Goharinejad and Hajesmaeel [1] believed that the performance of our computers

is still advancing exponentially. In the process of vigorous development of computer software and hardware technology, virtual reality technology will finally display technology in various fields such as economy, culture and military. Using a computer as a platform, this technology cooperates with other peripheral virtual reality hardware and software resources to jointly create a virtual world. This technology can give the experimenter a real sense of being in it. Human-computer interaction is no longer a simple mouse, keyboard and monitor, but an all-round and three-dimensional communication and interaction directly with the computer-generated illusory world through human senses. Mori et al. [2] believed that the participation of virtual reality technology in TV program production is a huge breakthrough in TV media technology. This application has also brought about a huge innovation in the concept of TV program production. With the vigorous development of computer technology, Lapborisuth et al. [3] believed that computer performance is becoming more and more powerful, which has become the basis for the realization of virtual reality technology.

There are many studies on the application of virtual reality technology in TV media in western countries. And have achieved fruitful results in different research fields. At the same time, Zhang and Kou [4] believed that the research results also gave birth to two very famous R&D companies. Among them, Vizrt Company from Norway has become the world's largest supplier of virtual reality technology for TV media. As an industry benchmark, Vizrt's virtual studio technology has attracted the attention of the world's major media. The latest version of the technology enables full HD true 3D image transmission. Among them, the virtual-real combination technology (virtual foreground technology) derived from the virtual studio technology is very excellent. Skurla et al. [5] believed that this technology can perfectly integrate virtual objects and even virtual animations into the studio or field shooting. This technology integrates 3D tracking technology and 3D production technology, and is a new application of virtual reality technology in the direction of TV media. This technology has been used in previous US elections, the official broadcast of the Olympic Games, the Eurovision Song Contest and other exciting programs. In 2008, CNN in the United States used virtual reality technology to perfectly report the presidential campaign.

The virtual Capitol Hill is presented in the studio, and the combination of reality and reality is refreshing. In 2010, in the European talent show "European Song Contest", the particle flags and classic videos above the stadium were constantly displayed. Touil et al. [6] believed that this technology shocked all audiences, reproducing the virtual effect in real outdoor. China began to introduce virtual studio technology in the late 1990s, forming products from companies such as Dayang, Sobe, and Ovison. With the continuous development of 2D, 2.5D to true 3D technology, until today, this technology has been skillfully applied to various programs. In recent years, the 2D and 2.5D studios of Jiangsu TV station are decreasing, and 3D technology has become the mainstream of virtual studios. At present, Bakshi et al. [7] believed that the virtual implantation technology combining virtual and real has begun to emerge in domestic TV programs. The second is the increasingly mature virtual implant technology. Virtual studio technology has been basically popularized in TV media all over the world, and virtual implantation technology is a new technology used by virtual reality technology in TV media. The technology brings new visual experiences to viewers, and new tools and creative new thinking for TV producers. Zhao [8] believed that the application of virtual reality technology in the field of television is fundamentally an application scenario centered on artistic design. The application uses technical means as a carrier to express artistic ideas and create new types of TV programs. Artistic ideas run through the entire process of technological realization, and the two become an inseparable unified whole.

1.1 The Development of Virtual Reality Technology

The earliest application of virtual implantation technology in domestic TV stations is CCTV's 2010 World Cup live program "Feast of Giants". The three-dimensional virtual stadium, team lineup, football and other virtual models produced by the artist are implanted in the studio and interact with the host in real time. This technique brings visual enjoyment to the audience. Since then, Beijing TV Station and Shanghai TV Station have successively purchased the same equipment and applied the virtual implantation technology to their respective columns. Major TV stations continue

to use virtual implant technology in their TV programs. Guevara [9] believed that various TV stations across the country have begun to introduce virtual implant technology in program production. In order to win the audience's attention, and occupy a place on the ratings charts. It can be said that the application of studio technology has entered the stage of virtual implantation from digital special effects, virtual scenes, and online packaging. From the perspective of program form, not only news, finance and variety shows will widely use virtual implantation technology. Moreover, Desselle et al. [10] believed that the popular blind date and imitation shows have also successfully applied this technology. It can be predicted that in the near future, there will be more and more novel and illusory virtual implantation effects on domestic TV screens. The Vizrt virtual system work flow chart (the picture is drawn by the author) is shown in Figure 1.

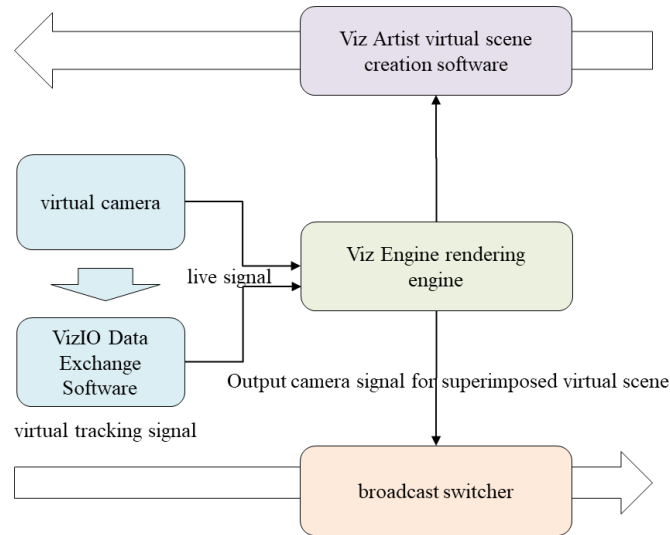


Figure 1: The Vizrt virtual system work flow chart (the picture is drawn by the author).

1.2 Competition between TV Media and Internet

In the past few decades, China's TV industry has made great progress, and fierce competition has also formed within the TV industry. The rapid development of the Internet has had a severe impact on the TV industry. The TV industry seems to be a giant, but in fact it is shrinking every year, and it is shrinking more and more. A few figures can fully illustrate the problem: CNNIC statistics in June 2013 show that China has 590 million Internet users, of which 460 million are mobile platform users. According to the "2013 Radio and Television Blue Book", there are only 210 million cable TV subscribers in China. In 2012, the advertising revenue, which is the pillar of TV industry revenue, was more than 80 billion in China. This figure is only slightly better than the Internet's 75 billion, but the Internet is increasing year by year at a level of 26% per year. In contrast, the TV industry advertising market grew by only 11.5%. It can be seen that the gap between TV media and the Internet is constantly widening in terms of technical strength, number of users or advertising scale. The balance of power between the two sides has changed dramatically. Under the wave of new media, the embarrassing situation faced by TV media forces TV people to seek innovations and changes in all fields of production, communication and marketing. TV communication needs to maintain the advantages of image, sound, graphic and text integration, and consolidate the influence and advertising value of traditional media. Television media needs to actively respond to the impact of the Internet, the underlying technological revolution. In the field of TV program production, the application of new technology has become the first problem faced

by TV people. At the same time, the development of computer technology and the advancement of virtual reality technology have made the deepening application of this technology in TV programs clearer.

From the current point of view, the advantages brought by the deepening application of virtual reality technology to TV programs are mainly in the following aspects. The various advantages of virtual reality technology have brought about new changes in the technical level and production concept of TV program production. Although represented by CCTV, more and more TV stations use virtual reality technology to upgrade and revise their columns. However, the traditional media lacks systematic combing and elaboration on the detailed operation mechanism of this technology. In this paper, the application of the current virtual reality technology in different types of programs. This paper analyzes the impact of virtual reality technology on TV programs in detail by combining broadcast examples. The research results of this paper provide a reference for how we can more reasonably apply virtual reality technology in the future. This technology also makes up for the lack of academic papers on virtual reality technology in the field of television. And put forward views and suggestions on the exploration of new technology in the application of TV media in the future.

2 APPLICATION OF VIRTUAL REALITY TECHNOLOGY IN TV PROGRAM PRODUCTION

2.1 News Program Application

The application of virtual reality technology in the field of television is to take artistic design as the core and technical means as the carrier to finally express artistic ideas and create new TV programs. Artistic ideas run through the entire process of technological realization, and become an inseparable unity of content. The complete process is: from the program idea or theme idea, the creator designs the final rendering of the program. Based on this, the creator determines the software and hardware requirements. When the supporting equipment is in place, the system begins to create virtual scenes, virtual elements and animations. In the whole process of technical realization, the system takes the final artistic effect as the core. The idea of system design runs through, which is to express artistic charm through technical means. The application of virtual reality technology in the field of TV is mainly divided into two parts, namely virtual studio technology and virtual implant technology. Virtual studio technology occupies an important position in the current TV production field, and major domestic TV media have their own virtual studio systems. The system not only improves the quality of the program, but also eliminates the tediousness and expense of repeatedly building live scenes. The virtual studio can easily replace the environment background, so that different programs can use the same studio. In this way, the utilization rate of equipment can be increased, and the program cost can be further reduced. Virtual implantation technology is widely used in the production of domestic TV programs. First appeared on a studio show. Later, it bloomed dazzlingly on large-scale variety shows. The introduction of this system can combine the content of the program, enrich the means of performance of the program, and create a splendid effect that is difficult to achieve with traditional stage technology. At present, the comprehensive application of virtual studio and virtual implant technology has become a new trend in TV program production. Depending on the type of program, the ways in which the two are applied and the effects they produce are slightly different, and this article will compare them. The Software and hardware working flow chart of virtual reality software system is shown in Figure 2.

2.2 Entertainment Evening Program Application

Whether it is video news, picture news, interview news or live reports, the studio series part is very important. A virtual studio can easily and quickly change the environment. This feature can better meet the audience's requirements for high timeliness and high authenticity.

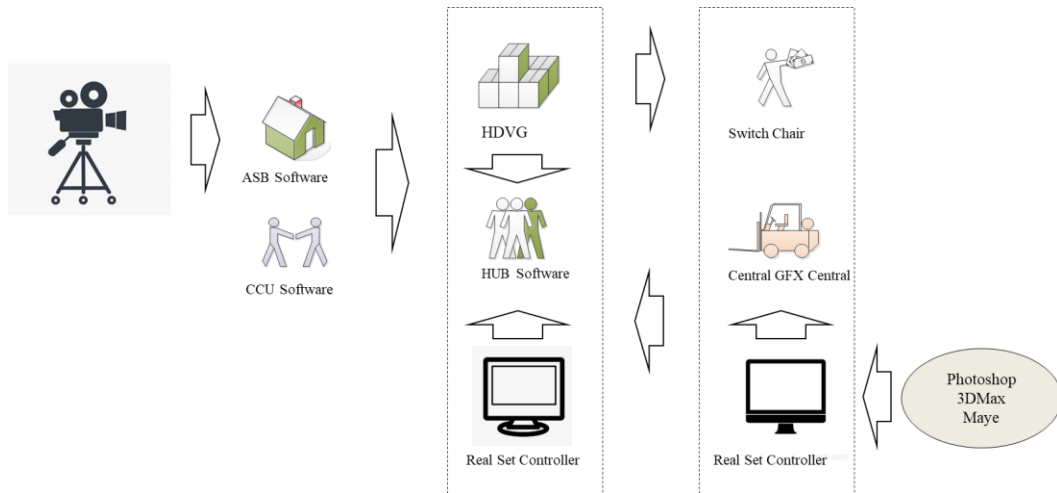


Figure 2: The Software and hardware working flow chart of virtual reality software system.

At the same time, the application of virtual implantation technology makes the news content richer, more vivid and more readable. Taking the "News Eye" column of mainland TV stations as an example, this paper analyzes the application of virtual reality technology in news programs. Jiangsu Satellite TV launched a new news and magazine column "News Eye" on January 1, 2012. This is a news magazine with a new concept. The magazine selects the most valuable news, stories and investigative interviews, and is influenced by the environment with sharp perspectives, precise responses, and unique insights. The show analyzes internal causes through the appearance of events. Different from regular information broadcast news programs, "News Eye" has the slogan "Look at the world, know the cold and warm". From the perspective of people's livelihood, the program profoundly interprets news viewpoints. The program covers news information, true love stories, in-depth interpretation and many other aspects. The program is panoramic, multi-tentacled, and deeply digs into the content of the news. The host's sonorous and powerful comments and the civilian language style also added a lot to the show. In addition, the program integrates news resources from multiple platforms such as TV and the Internet, and introduces new elements such as Weibo and Paik, which increases the sense of interaction between TV and new media. The program's expression of news content is timelier. What is worth looking forward to is that the program has invited the top Vizrt team to join, and spent millions of dollars to create a broadcast method that combines virtual and real scenes. This broadcast effect allows the audience to understand the whole process of news events more vividly and intuitively. The Comparison of positioning differences of virtual planting technology in various projects is shown in Figure 3.

2.3 Sports Program Application

First, according to different news content, designers use VizArtist virtual design production and control software to creatively design different three-dimensional scenes and animations. And, load it into the VizEngine HD 3D engine for real-time rendering. Secondly, the software is equipped with a camera equipped with a special tracking device to shoot the real scene, and the special tracker will convert the mechanical motion such as the camera's push, pull and pan into tracking signals. And, the system outputs the signal to the VizEngine HD 3D engine. In the "News Eye" column, the system uses a camera with virtual implantation technology to shoot at a fixed position, so the tracker does not actually play a role. Finally, the system uses the VizEngine high-definition 3D engine to superimpose and render the virtual scene and the real scene picture, and then output it

to the video switching TV station for broadcast. The Integrated application framework of virtual reality software system in TV station system is shown in Figure 4.

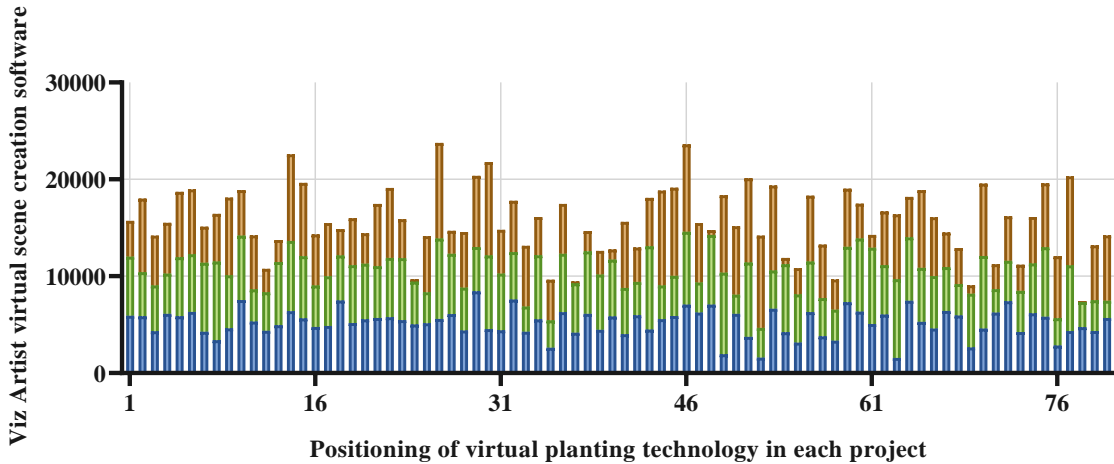


Figure 3: The Comparison of positioning differences of virtual planting technology in various projects.

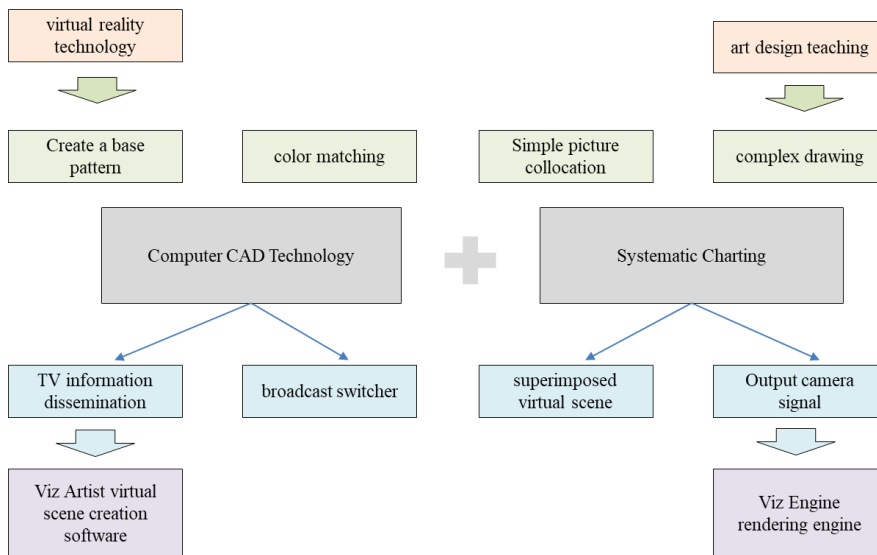


Figure 4: The Integrated application framework of virtual reality software system in TV station system.

The production of virtual scenes is completed by VizArtist, a professional animation creative design and production tool. Designers design virtual scenes based on news content and the opinions of column groups. The whole scene production process is divided into three parts, which are divided into three parts: building the model, assigning the model texture material, and making key frame animation. First of all, VizArtist comes with some basic model and deformation controls. Although these controls cannot support complex modeling work, they can provide better support for model

files of other 3D modeling software. For example, 3DMAX and MAYA models in OBI or WRL format can be directly imported into VizArtist for use. This model provides designers with great convenience. And VizArtist system also supports almost all mainstream image formats and audio formats. Secondly, by assigning materials to the model through system operation, the VizArtist system has extremely convenient material editing capabilities. This enables TV program directors to obtain very good TV animation effects with very few operations. Finally, the system renders the key frame animation of the edited model, and uses the built-in plug-ins of VizArtist such as model motion, particle smoke, and water motion to create realistic animation effects. When making a scene, the hardware should always pay attention to saving system resources. Although VizArtist software has strong real-time rendering capabilities. However, overly complex objects and special effects will still occupy system resources during animation. This situation will seriously cause the animation to slow down and cannot be rendered in real time. For example, when making an array of 10*10*10 cubes, if you assign a material to each cube, you must calculate the material effect a thousand times during rendering. However, if this array is formed as a whole, and the overall material properties are given. The system only calculates it once when rendering, but the rendering effect is exactly the same. There is also a need to pay attention to less, the model uses more textures in use, try to use the baked texture to replace the model. At the same time, the triangular faces in the scene are further reduced to ensure that the system can reduce the pressure during real-time rendering.

3 THE APPLICATION VALUE OF VIRTUAL REALITY TECHNOLOGY IN TV PROGRAM PRODUCTION

3.1 Virtual Reality Technology Meets the Psychological Needs of TV Audiences

It is the simultaneous display of knowledge and interest. Virtual reality technology is an innovative teaching method. Generally speaking, for most vocational college students, virtual reality technology is more interesting. In the process of art design teaching, virtual reality technology can also give students a better learning experience. In the process of applying virtual reality technology, a practical and comprehensive teaching situation should be created around the teaching content. Through the application of technology, a fun and relaxed teaching atmosphere is created, students' enthusiasm for learning is continuously improved, and their imagination space is expanded. Through school teaching, let the student group master the core concepts and main knowledge content. At the same time, classroom teaching should try to concretize abstract problems and simplify complex problems. The Comparison of the effect of virtual reality technology on enhancing the competitiveness of traditional programs is shown in Figure 5.

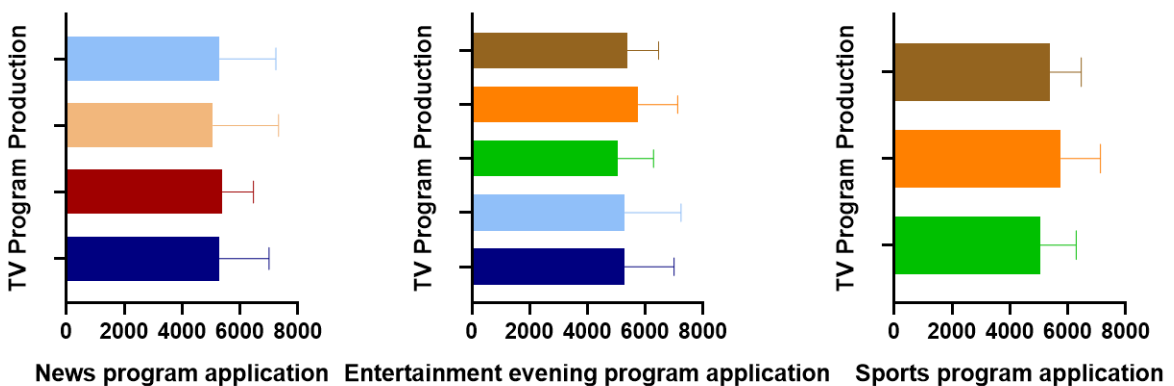


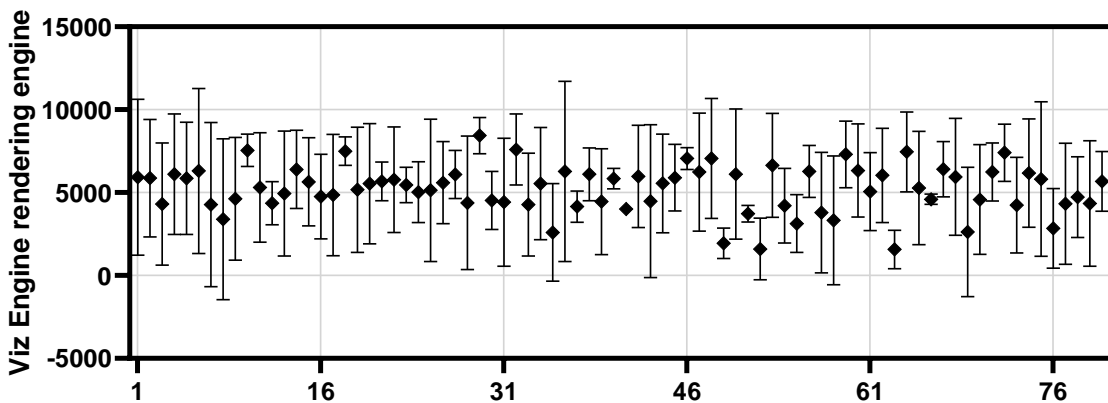
Figure 5: The Comparison of the effect of virtual reality technology on enhancing the competitiveness of traditional programs.

From the perspective of production methods, traditional programs mainly shoot things that do exist in real life, which are inevitably affected by many uncertain factors (seasons, weather, actors, regions, etc.). This influence determines that the production cycle must be longer, requiring more time and cost, and more manpower and material resources. Since the development of traditional TV programs, there are practical problems such as the tendency of artistic expression and display methods to be single, and the lack of expressiveness. These problems can easily cause the audience to have aesthetic fatigue, and even have a sense of resistance. Generally speaking, it is difficult to make a breakthrough in this direction by relying on the original technology. Although the pace of innovation of TV people has never stopped, the existing programs have made breakthroughs and innovations in various aspects such as program opening, link design, stage art, lighting, sound effects, and large screens. This innovative model presents the audience with a comprehensive visual feast of TV sound and light. However, traditional technology still brings certain limitations to TV performance. This limitation includes time cost, labor cost, and economic cost and so on. In addition, the program needs in-depth thinking in terms of theme planning and content selection, and will have different effects on the specific content presentation method.

3.2 Comparison of Traditional Programs and New Programs that Introduce Virtual Reality Technology

At present, TV stations have introduced virtual reality technology into TV media, which has a positive impact on program planning, packaging production, and broadcast operations. Virtual studio systems use software to generate backgrounds and props, which can create scenes that don't actually exist or are difficult to create. These technologies can change scenes in an instant, producing effects that cannot be achieved in a real studio. The space of the virtual studio is not limited by physical space, and the camera can rotate in 360 degrees. Cameras can introduce a large number of virtual special environments and props, thus creating a richer and more engaging program. These props and techniques enable directors to largely get rid of the constraints of time, space and prop production. Let the audience get more creative imagination space. The fusion between the computer-generated background and the actors is perfect. Virtual reality technology can produce novel visual effects at low cost and improve studio utilization. At the same time, the production, modification and saving of virtual reality scenes can all be carried out on the computer. The system saves a lot of manpower, material and financial resources by making and replacing electronic sets. In addition, the system can shorten the target production cycle. Through the application of virtual reality technology in TV media, TV stations enhance the competitiveness of programs and promote the reform and evolution of program forms. In addition, TV stations use virtual reality technology to satisfy audience psychology. The system analyzes the application value of virtual reality technology by improving the user experience. The Virtual reality technology promotes the reform and evolution of TV programs is shown in Figure 6.

In terms of the specific presentation of technology, the virtual reality system has made a subversive attempt. The program planner has just returned from an investigation in Taiwan, and the Apple TV program (One TV) founded by Taiwan next Media has left a deep impression on us. This kind of news program relies entirely on virtual reality technology to restore, reproduce or directly shape a news event. This technology is widely used in the range of Chinese TV with virtual reality technology. At that time, there was no large-scale use of these technologies in all provincial TV media in mainland China. Therefore, the program team of the TV station considered using this technology to make an attempt to transform the overall image of the program through technical means. At the beginning of the "News Eye" column, the time was very tight. The primary problem with TV production is the need for personnel. Because of the shortage of manpower, or seconded from other brother channels, or recruit new people and other ways to supplement. In addition, due to the influence of the national public opinion environment, these two years were the most cautious and serious period of the national public opinion environment, and many materials could not be reported.



Virtual reality technology promotes the reform and evolution of TV programs

Figure 6: The Virtual reality technology promotes the reform and evolution of TV programs

All kinds of TV programs in our country are subject to great restrictions on the choice of subject matter and the scale of reporting. There has been no change in the form of news programming in recent decades. For nearly ten years, the TV station has not run such programs as people's livelihood news and social news.

3.3 Virtual Reality Technology Enhances the Competitiveness of Traditional Programs

Moreover, the team of the "News Eye" column is not willing to host a so-called people's livelihood news program in the traditional era. Therefore, the "News Eye" column is a new way out in the cracks. Looking for new program positioning and program concepts, this is a relatively innovative place. In terms of technology, the "News Eye" column has introduced a set of hardware systems that are considered mature in the world. The program team needs to run in with the designers of Vizrt Company, and communicate the required animation creation concepts and final images with the animation designers. The "News Eye" column only has a set of virtual reality technology engine, and the virtual picture presented at present only relies on the virtual foreground animation technology. However, this technology cannot form a unified virtual place at present, and it is difficult to support more complex scene applications. The Virtual reality technology meets the psychological needs of different TV audiences is shown in Figure 7.

3.4 Virtual Reality Technology Promotes the Reform and Evolution of TV Programs

Normally, such a system should be supported by two or three sets of engines. First of all, one set is responsible for the plane, and the other set is responsible for the rocker arm and the high-altitude motion lens. In this way, a virtual place can be formed in the studio. A more ideal situation is to add a virtual background, similar to the blue box technology of traditional virtual studios. This technology can form a fully virtual environment for the front and back scenes, which will have greater significance for the visual breakthrough of the entire program. On the other hand, from the perspective of its own content, the show still has many flaws. The flow of personnel in the entire team has always been relatively large, and there is more fresh blood. The advantage of this kind of flow is that the newcomers are full of passion, creativity, and motivation. The problem is that they need more time in the production of large-scale programs. This also leads to a relatively long cycle of program production. The program team actually builds the program while cultivating the team, and a considerable number of personnel are trained almost from scratch.

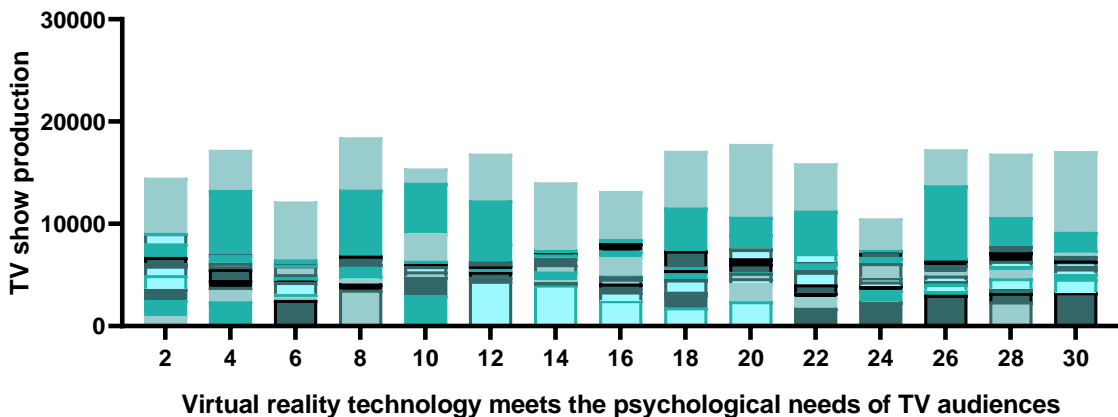


Figure 7: The Virtual reality technology meets the psychological needs of different TV audiences.

From the perspective of the overall viewing competition environment, if the news programs are packaged in detail, the viewing effect of the programs should be higher. The main audience during this period are middle-aged and elderly audiences, so these two programs occupy half of the audience. In the competition of provincial TV stations, the three provincial-level media that are more powerfully intertwined in news, including Jiangsu Satellite TV, Hunan Satellite TV and Dragon TV. Although Hunan Satellite TV also does news, strictly speaking, what it does is entertainment, such as "Journalism Seeking Truth", "News Party", "Civilian Heroes" and other programs. The entertainment element is greater than the news element, and the influence of Hunan Satellite TV itself is still higher than that of Jiangsu Satellite TV. Dragon TV's program is another old-fashioned program that has been running for nearly 20 years. But for now, the competition of the three satellite TV programs still has its own advantages and disadvantages, and no one can occupy the position of the boss for a long time. The competition pattern is complex, and it is difficult to achieve an ideal position in a relatively short period of time.

4 CONCLUSION

In the age of entertainment, and facing the wave of new media, TV media must actively respond to various crises. TV media introduced virtual reality technology at the technical level to improve the overall quality of programs. This form can provide a good role for TV program innovation. With the continuous development of computer level, virtual reality technology is also constantly maturing. The technology has evolved from early 2D virtual studios to full 3D virtual studios to virtual implants. We can see the deepening application of virtual reality technology in the field of TV. This technology has had a huge impact on the television medium. As virtual reality technology improves day by day, it will play a more important role in the television field in the near future. The application of virtual reality technology in the field of television is mainly divided into virtual studio technology and virtual implantation technology, both of which belong to augmented reality virtual reality technology.

Through the application of virtual reality technology in different types of programs, these technologies finally show different roles. We can know that the application of virtual reality technology is of great significance to TV programs. From the perspective of the realization process of virtual reality technology, the idea of art design throughout the process is consistent. This idea is the application goal and core of virtual reality technology, where technology and design become a unity. The application of virtual reality technology in the production of TV programs has had a

huge impact on TV media in terms of enhancing the competitiveness of programs, promoting the reform and evolution of program forms, satisfying audiences' needs, and providing novel audio-visual experiences. These technologies have changed the way people perceive. Virtual reality technology has shown great value in TV media applications. However, the abuse and misuse of this technology can also cause serious harm. This requires creators to strictly grasp the scale, abide by the law, and pursue the authenticity of the program. This paper starts with the positioning and role of virtual reality technology in different types of programs, and analyzes the significant impact of virtual reality technology on TV programs. This paper then draws the important value of virtual reality technology to TV media. On this basis, combined with examples, the adverse consequences that may be caused by the abuse and misuse of virtual reality technology are described, and the conditions and requirements for the rational application of virtual reality technology are further proposed. It is hoped that the research in this paper can provide a useful reference for media people who are exploring the path of applying new technologies to traditional TV media.

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