

Innovative Research based on Red audiovisual Education for Youth Using VR Technology

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Abstract: Red culture embodies the rich revolutionary practical experience and profound historical spiritual connotation of the Chinese nation. This paper explores the design of virtual reality audiovisual propaganda targeting youth by promoting the deep integration of VR technology with red culture, providing theoretical foundations and practical approaches for advancing China's distinctive VR-based red cultural promotion.

Keywords: VR technology, red culture, audiovisual promotion

1. Introduction

The concept of Virtual Reality was first proposed in the 1980s. Over time, it has matured and brought revolutionary changes to the world. As a comprehensive technology integrating computer graphics processing, screen display technology, signal sensing technology, digital simulation technology, and more, VR technology merges multi-sensory experiences with human vision, touch, hearing, and smell, enabling end-users to interact with Virtual Environments (VE). In its application, the virtual and real worlds overlap. By leveraging stark contrasts with reality while resonating with users' authentic experiences, this technology evokes profound human empathy.

The rapid advancement and increasing maturity of the VR industry today unlock boundless potential for its future development. Across all sectors, there is an active pursuit of deep integration with VR technology. As it shoulders the mission of realizing the great rejuvenation of the Chinese nation, China must strengthen its cultural soft power. As a pivotal element of the socialist core value system, red culture plays a crucial role in the development and dissemination among young people. Actively exploring the integration of VR technology with red audiovisual dissemination, intensifying cultural promotion efforts, focusing on core nodes, and responding to the Party and state's call to "pass down the flame of ideals and convictions, the genes of red traditions from generation to generation, ensuring the revolutionary cause endures and its spirit lives on, forever preserving the true colors of the old Red Army" are critical challenges that must be addressed.

2. Research Status and Research Methods

As an embryonic concept, VR technology gradually gained prominence at the turn of the century, fueled by rapid technological advancements. Scholar Jonathan Steuer, in defining virtual reality from a teleological standpoint, contended that nonverbal exchanges within VR cannot be distinguished from social interactions in the real world. Such interactions can equally foster human emotional bonds and generate "collective intelligence" through engagement. In his paper *Analysis of Virtual Reality Technology Applied in Education*, Johnston also dissected the connection between VR technology and education. Internationally, VR applications have evolved rapidly—from early simulators like Sensorama and the "Sword of Damocles" to the recent surge in popularity of the Oculus Quest 2.

Domestic research on VR began relatively late. At the end of the 20th century, scholars such as Li Jintao and Liu Guoxiang comprehensively introduced the meaning of VR, its system structure, the composition of VE, and the applications of this technology to the Chinese public, sparking a wave of domestic research. In terms of research focus, domestic studies emphasize applying VR across various fields, boldly exploring possibilities and practicality through speculation and experimentation. In their research, Sun Qian and Zhou Guochun detailed

how VR technology can be applied to build simulated tour systems, facilitating the education sector in organizing revolutionary tourism study trips for youth. Yu Mingyan, from a theoretical perspective, explored how VR technology transforms the presentation of revolutionary culture. This memory construction, characterized by digital technology, generativity, and flexibility, can comprehensively advance the development of revolutionary culture.

In recent years, VR technology has experienced explosive growth, while the media sector faces urgent demands for transformation. This paper will focus on examining the integration and collision between VR technology and audiovisual promotion of revolutionary culture. Drawing on relevant scholarly works, it will explore both the theoretical necessity and practical feasibility of this approach. The research methods required include:

Literature Review Method: Organizing and synthesizing relevant literature to establish a foundation for comprehensive and accurate analysis of the research content.

Survey research: Participating in various VR technology exhibitions and conferences to understand the latest trends and application outcomes of this technology.

3. Advantages of Red Audiovisual Propaganda Based on VR Technology

Looking around, many educational propaganda models and audiovisual rules once held as sacred have become obsolete and serve no purpose by clinging to outdated practices. When the audience consists of young people in the new era with diverse perspectives, traditional red culture audiovisual formats should retain their best elements while undergoing a new transformation.

VR technology possesses the “3I” characteristics: Immersion, Interaction, and Imagination. Immersion refers to the state where users, subjected to multi-sensory stimulation, feel a sense of indistinguishable reality and unreality while merging with the environment. Interaction involves engaging with virtual scenarios and characters within a Virtual Environment (VE) through various sensing devices, motion capture, eye-tracking, and other technologies to receive sensory feedback. Imagination denotes users extending their immersion and interaction into mental contemplation, gaining new insights and achieving emotional resonance, ultimately fulfilling self-satisfaction.

Over the past half-century, technological innovation has enabled humanity to progressively simulate, alternate, and extend physical senses. This process, accompanied by spiritual enrichment and expansion, has endlessly blurred the boundaries between reality and imagination. S. Mandal and colleagues categorized VR technology into three main types: non-immersive desktop virtual reality, semi-immersive virtual reality, and immersive virtual reality. Among these, immersive virtual reality systems enhance the user's immersive experience through non-visual technologies, aided by various peripheral devices. This leads to the recognition that employing VR technology to construct a virtual environment saturated with knowledge and experiences, coupled with realistic interactivity, enables users to attain immersive experiences indistinguishable from real-world environments. Such experiences offer the following three advantages:

3.1 Transforming Traditional Red Audiovisual Communication Models to Deliver Fresh Experiences

Within the enduring theme of patriotic education, preserving, inheriting, and promoting red culture has always been a vital component. However, as audiences and technologies evolve, both the content and formats of such promotion must adapt. It is imperative to recognize that the outdated approach of relying solely on text or images to disseminate red culture no longer aligns with contemporary lifestyles and psychological traits. This one-way dissemination lacks interaction and communication, resulting in a monotonous and unengaging mode of transmission.

The purpose of media is to enable audiences to engage in passionate, subjective explorations of

the world. Compared to traditional communication methods, VR technology offers adolescents a qualitative leap in experiential immersion, where “fun” drives them to actively pursue these experiences. With the continuous evolution of computer graphics processing and hardware technology, VR technology progressively blurs the visual distinction between virtual environments and the real world. The emergence of terminal hardware products—including displays, headsets, controllers, and gloves—within this technological suite delivers a transformative learning experience.

VR technology can recreate digital scenes. Using 3DS MAX modeling, it constructs virtual red cultural heritage sites and related exhibits. Accompanied by narration and enhanced with musical rendering, it allows visitors to view historical relics from multiple angles and gain a comprehensive, intuitive understanding of the hardships endured by our forebears. This immersive experience enables visitors to feel the weight of red history and grasp the essence of red culture.

Traditional methods of promoting red culture have been constrained by practical limitations. For instance, the arduous battles fought by revolutionary martyrs could only be conveyed through images, text, and videos. Younger audiences, lacking personal experience or interest, often found such presentations ineffective. However, virtual reality technology can simulate war scenarios, offering them a realistic medium for engagement. With VR headsets and interactive systems, they can immerse themselves in historical environments and recreate revolutionary scenes. This approach conveys information through multiple channels, enhancing authenticity. The immersive virtual reality creates a perceptible environment that surrounds the audience, while the integration of sound and visual scenes fosters a sense of presence. Within the virtual setting, it sparks self-identification, encouraging emotional engagement to care for, sympathize with, and admire revolutionary martyrs. This achieves a highly effective audiovisual dissemination of red culture.

Virtual reality technology has revolutionized the dissemination system for revolutionary heritage resources. With the proliferation of VR exhibition halls, VR museums, and VR cultural heritage sites in revolutionary audiovisual cultural promotion, innovative dissemination methods have yielded remarkable publicity outcomes.

3.2 Stimulating Youth Interest and Engagement in Learning Red Culture

The application of VR technology has expanded the avenues for disseminating red culture. Diverse and personalized media formats, highly interactive dialogue models, and more immersive virtual environments can all enhance young people’s enthusiasm for learning.

VR technology brings to life natural environments that are difficult to fully showcase in everyday teaching. At SIGGRAPH 2019, NVIDIA commemorated the 50th anniversary of the Apollo 11 moon landing by simulating the lunar landing experience. Using pose estimation technology, attendees were superimposed onto astronauts exploring the moon’s surface, allowing them to personally experience the lunar environment. In the Red Army audiovisual exhibition, simulations of snow-capped mountains and grasslands encountered during the Long March engage young visitors through visual, auditory, tactile, and olfactory channels. This immersive experience deepens their understanding of the revolutionary spirit embodied by the martyrs who selflessly dedicated themselves to realizing their ideals.

VR technology can also reconstruct historical spaces that no longer exist. In recent years, Google, one of the giants in the VR industry, has developed a series of virtual scenes for World War II educational courses. In China, the overall preservation of red cultural heritage sites urgently requires attention, and the spatial distances between these sites are relatively vast. Therefore, utilizing VR to recreate historical spaces can enhance the interactivity and engagement of young people in learning about red culture.

The vast red resources and immersive VR experiences can evoke positive emotions such as optimism, curiosity, and excitement in adolescents undergoing psychological maturation. Highly

realistic special effects and interactive dynamic settings stimulate viewers' interest in learning, fostering positive emotional responses to the exhibition. This approach fully mobilizes young people's enthusiasm and initiative when applying VR technology to study red culture, yielding remarkable educational outcomes.

3.3 Overcoming Geographic and Time Constraints in Red Cultural Media Outreach

Having navigated the pandemic era, we have fully recognized its impact on public cultural dissemination. From the initial halt in human activities and social life to the current phase of full reopening, the pandemic has reshaped societal memory. This compels us to consider how to enhance young people's experience of red cultural services accessed online under these unique social conditions.

The application of VR technology has successfully addressed this challenge. By creating conditions for audiences and establishing multiple open-access platforms for revolutionary cultural themes through VR-based resource libraries, it achieves diverse formats within the comprehensive development of revolutionary resources. This approach promotes the sharing of relevant resources online, fully leveraging the unique advantage of virtual reality to overcome temporal and spatial constraints. It inspires adolescents' proactive learning attitudes, enabling them to use mobile devices to select relevant themes for self-directed learning based on their individual needs and interests. This lays a solid foundation for the outcomes of patriotic education among youth, enabling them to accumulate knowledge steadily until it culminates in significant achievements.

4. Applications of VR Technology in Red Audiovisual Culture

Today, the metaverse propels the era forward at breakneck speed, while virtual reality ushers in a new age for media. In the era of big data, technology can precisely capture learners' educational needs, aesthetic preferences, and experiential demands. It filters abundant red cultural resources, innovates classic revolutionary works, and creates a comprehensive, multidimensional, and broad-spectrum promotional environment to meet the personalized needs of young people. Internet users can enjoy immersive, interactive communication through accessible and portable mobile devices, while the internet effectively ensures the digital dissemination of red audiovisual culture.

In practical promotion, integrating VR technology distills the core essence of red cultural heritage across regions. The unwavering revolutionary conviction of martyrs who sacrificed their lives for the cause serves as the spiritual backbone of red-themed games. Within VR, historical spaces are reconstructed and historical environments recreated. This approach stimulates young people's identification with red culture by enhancing multi-sensory experiences, innovating expression methods, revitalizing cultural transmission, and optimizing promotional models. Leveraging VR technology, it heralds a creative turning point in the audiovisual dissemination and inheritance of red culture.

Additionally, a comprehensive VR practice base can be established to promote revolutionary culture, encompassing systematic audiovisual resources on revolutionary heritage. First, VR exchange and experiential spaces can utilize auxiliary equipment like VR headsets to facilitate immersive learning for students. For instance, they can tour the virtual exhibition hall of the Long March, interact with maps following the footsteps of revolutionary forebears, and engage in autonomous virtual interactive learning along the main timeline of the Party's century-long history, transcending temporal and spatial constraints. Second, VR interactive immersion venues leverage VR technology integrated with 5G, cloud computing, and CG. Utilizing specialized equipment, these spaces recreate historical events like the War of Resistance Against Japan. Youths are transported into the virtual historical context of that era, experiencing the fiery battles of the Hundred Regiments Offensive and witnessing the indomitable fighting spirit of the Eighth Route Army. They can also immerse themselves in Yan'an during the Seventh National Congress of the

Communist Party of China, witnessing the dawn of victory for China. Next, the Red Spirit Heritage Corridor unfolds against the backdrop of the Communist Party of China's tortuous development journey. Characters and scenes flow along a timeline, where visitors autonomously trigger QR codes using VR headsets and other auxiliary devices. Key knowledge points are intuitively presented through audiovisual formats. Finally, the VR Cloud Space serves as the foundational platform connecting all sections as an auxiliary system. This comprehensive VR practice base, fully leveraging VR products and software, is built upon the guiding principles of "rejecting artifact-based teaching, refusing check-in-style experiences, bringing the past into the classroom, and deeply popularizing values." It not only enhances young learners' proactive engagement but also transforms one-way reception into two-way interaction, significantly boosting the efficiency and scale of red culture promotion.

5. Principles for Red Audiovisual Propaganda Supported by VR Technology

5.1 Inheritance and Innovation

Red audiovisual communication models can innovate while preserving tradition. New media platforms can more effectively disseminate red culture, but such communication must steadfastly uphold its enduring spiritual core. Firm ideals and convictions form the solid foundation for transmitting red culture, while tenacious revolutionary spirit propels its continuous advancement. Only by inheriting this spiritual essence can red audiovisual communication remain true to its essence—even as it adapts to new platforms and channels—without distortion or loss of authenticity.

Innovation also has its guiding principles. In today's era of rapid technological advancement, humanity's spiritual and cultural needs are undergoing swift transformation. The content and forms of past revolutionary classics largely fail to meet contemporary cultural demands. This does not signify that young people have abandoned revolutionary culture; rather, it reflects an insufficient effort to deeply explore and creatively reinterpret these cultural resources. Therefore, propaganda content must adhere to the "Two Hundreds Policy" and the "Two Serves Orientation," keeping pace with current events, staying close to daily life, aligning with reality, and grasping the pulse of the times and the people's needs. Only then can it fulfill its educational role.

When innovating, communicators should pay attention to the trend of virtual reality and red audiovisual communication overlapping, explore the characteristics and patterns of audiovisual communication in the metaverse era, use the internet as a platform, and reform the form of red audiovisual communication in accordance with the laws of internet communication, with the aim of attracting more young people to learn and inherit red culture. Over the past decade, animation and video games have gained immense popularity among youth, with internet-based dissemination pathways holding significant appeal for this demographic. Red audiovisual propaganda should ride this wave by deeply integrating with diverse media to achieve educational impact through entertainment. Technologically, systems can be built using VR panoramic technology, 3D modeling, and C# programming. Core display devices include PCs and touchscreen monitors, supplemented by VR headsets and glasses. The underlying internet communication methods are diverse and multifaceted. Therefore, the dissemination of revolutionary culture must not only deeply engage youth by resonating with their perspectives and appealing to both refined and popular tastes, but also employ diverse communication methods from multiple angles to achieve inclusivity and compatibility.

5.2 Truthfulness and Value

Scientific research must balance truthfulness and value, and red audiovisual propaganda adheres to this principle. Regardless of the technological means employed, its fundamental purpose is to disseminate the spiritual essence of red culture, enrich red cultural heritage, actively leverage its corresponding value, and provide spiritual impetus for socialist modernization.

Red culture is the crystallization of wisdom born from the integration of China's actual national conditions with Marxism. Tested by practice, it possesses truthfulness and scientific validity. Simultaneously, red culture comprehensively embodies the Communist Party of China's beliefs, ethics, conduct, and revolutionary spirit. Therefore, when conducting red audiovisual propaganda, it is essential to emphasize its value. Promoting red culture enhances the Party's governance capabilities and service delivery, fosters a harmonious society, and cultivates a thriving socialist market economy.

According to the “simulated environment” theory in communication studies, in today's media-saturated society, people are influenced by virtual media environments, perceiving them as the real world and adjusting their behavior accordingly. Red culture promotion must also cultivate an internet-driven dissemination atmosphere. Under government leadership, it should rally diverse forces to create a powerful communication momentum, thereby subtly instilling red cultural values in young people.

However, while disseminating revolutionary culture, we must also guard against vulgar trends online such as fabricating rumors about revolutionary heroes or trivializing classic revolutionary works. We must avoid excessive entertainment undermining the solemnity of revolutionary culture dissemination and resolutely strengthen positive guidance in promoting its dissemination.

6. Existing problems

6.1 VR Technology Remains Immature

Although virtual reality technology continues to evolve and advance, its practical applications in daily life still have significant room for improvement. Popular products like the HTC Vive, META Quest 3, and PICO 4 Ultra currently face challenges: high-quality software content remains scarce, hardware experiences are burdened by heavy devices causing physical strain, graphics suffer from stuttering, interaction tracking performance is subpar, and overall pricing remains prohibitively expensive. Furthermore, the diverse and high-intensity information delivery inherent in VR inevitably imposes cognitive burdens on adolescents. Therefore, content design must be tailored to the audience's age and cognitive level, ensuring seamless integration between virtual reality and the real world.

6.2 Psychological Issues Among Adolescents

The heightened fantasy and immersion of VR significantly amplify the impact of red culture propaganda. Immersive virtual reality greatly satisfies primal desires, while VR technology delivers more authentic experiences. Compared to traditional single-sensory stimulation, multi-channel sensory input more readily induces dependency among vulnerable youth groups. Within VE environments where the boundary between reality and illusion blurs, where lies the limit of what adolescents can endure? How should these boundaries be defined? Since its emergence into the mainstream, the anime/manga subculture—rooted in fictional scenarios and alternate worlds—has raised significant concerns about adolescent psychological addiction. The implementation of VR technology must carefully consider these issues and proceed with caution.

7. Conclusion

When VR technology is applied to revolutionary cultural audiovisual promotion, it offers innovative breakthroughs in youth education by enhancing multi-sensory experiences, revitalizing content delivery, optimizing media dissemination models, and invigorating the transmission of revolutionary heritage. This approach helps young people develop self-directed learning, enrich educational experiences, and achieve immersive learning within revolutionary cultural contexts. Moving forward, we must leverage VR hardware development and cutting-edge technology integration to promote revolutionary culture and deepen its communicative impact.

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