Application Research of Virtual Reality Technology in Folk Art Education in Guangzhou Universities under the Background of Digital Transformation

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Abstract: In the current wave of applied undergraduate education, Guangzhou universities are actively seeking to integrate the profound traditional Chinese cultural heritage, especially the unique and charming Guangzhou folk cultural resources, with cutting-edge technologies, particularly virtual reality (VR) technology, to promote innovation and distinctive development in art and design education. Drawing on Zhang Zhidong's ancient wisdom of "Chinese-style Westernization", although the historical background is vastly different, the combination of tradition and technology still exhibits strong vitality and unique value in promoting the inheritance and revival of ethnic culture. This combination not only reflects a keen insight into and active response to real-world problems but also highlights a pragmatic spirit in practical exploration, which is particularly crucial for Guangzhou universities' exploration in the field of folk art education.

Keywords: Digital transformation; Virtual reality technology; Guangzhou universities; Folk art education

1. Introduction

Since the creation of "Spacewar!" by the Steve Russell team at MIT in 1962, digital interactive games have gradually become a new frontier for entertainment and culture. Subsequently, William Crowther's "Colossal Cave Adventure" emerged in 1976, further enriching the connotations of digital games with its unique interactive design and narrative structure. In this context, countries such as Europe, America, Japan, and South Korea, relying on their powerful game industries, have not only promoted economic prosperity but also achieved widespread cultural dissemination and strategic competitive advantages. For Guangzhou universities, this global trend provides new ideas and opportunities for folk art education. Under the backdrop of digital transformation, how to effectively utilize virtual reality technology, deeply explore Guangzhou's

rich folk cultural resources, innovate educational models, and improve teaching quality has become an important topic that urgently needs to be explored [1].

2. Current application status of virtual reality technology under the background of digital transformation

In 2016, the School of Journalism and Communication at Tsinghua University took the lead by producing the VR film "Touching Tsinghua", which cleverly integrated the artistic conception of the classic literary work "Moonlight over the Lotus Pond" into the virtual world. This initiative not only broadened the expressive boundaries of campus culture and art but also painted a vivid blueprint for the application prospects of VR technology in the educational field. Simultaneously, research in the Department of Computer Science and Technology at the university focused on the deep optimization of animation digital interaction and telepresence, laying a solid technological foundation for the cloud integration and personalized matching of teaching content [2].

As a leader in domestic VR research, the Computer Science Department at Beihang University has made breakthrough progress in distributed virtual environment network design technology, providing powerful technical support for building real-time 3D animation databases and professional training systems. In particular, the establishment of the State Key Laboratory of Virtual Reality Technology and Systems in 2017 marked the university's deep layout and forward-looking planning in the field of VR education applications. The following year, the Software School took advantage of the momentum and launched a graduate program specializing in Virtual Reality Technology and Applications (VR), injecting strong momentum into cultivating high-quality VR education talents [3].

The "VR Xinchao" research report, jointly released by Tencent Research Institute and Zhejiang University, provides a deep analysis of the multi-dimensional impact of VR technology on individual psychological cognition, physiological health, and sociocultural aspects from a psychological perspective. It offers scientific theoretical foundations and rich empirical data for studying the potential psychological effects of VR in folk art education.

It is worth mentioning that Guangzhou, as a pioneer city in VR education development, actively builds high-end exchange platforms and has held multiple national and even international VR/AR education summits and competitions. The 2017 Guangzhou (National) VR Design Education Summit gathered numerous industry elites and academic authorities to jointly explore innovative applications and development trends of VR/AR technology in the field of art education. The following year's Guangzhou (International) VR/AR Education Summit and the First Guangdong Provincial Student VR Reading and Innovative Education Design Competition further demonstrated Guangzhou's firm determination and practical actions in promoting the popularization of VR education and facilitating VR content innovation.

3. Application of virtual reality technology in folk art education in Guangzhou universities in the context of digital transformation

3.1. Enriching talent cultivation program design based on abundant Guangzhou folk art resources

Driven by the deepening of digital transformation, the talent cultivation program design in the field of folk

art education in Guangzhou universities needs to closely align with their educational characteristics and the profound heritage of Guangzhou's regional culture. This involves deeply exploring and showcasing the unique charm of Guangzhou's folk art. By systematically integrating Guangzhou's folk art resources into the curriculum system of vocational art design, students' cognition of local cultural values can be deepened, strengthening their cultural identity and pride, and further stimulating their awareness of cultural inheritance and innovative potential. Specifically, cutting-edge courses such as "Innovative Design of Guangzhou Folk Visual Symbols" and "Digital Media Art Creation with Guangzhou Culture Themes" can be introduced. These courses skillfully integrate the core elements of Guangzhou folk culture with the essence of basic design theory and introduce creative expression techniques of Guangzhou folk visual symbols. This enables students to profoundly understand the unique charm and aesthetic value of Guangzhou folk culture while advancing their professional skills. Through the above talent cultivation program, the goal is to cultivate compound talents who are proficient in Guangzhou's regional culture and possess excellent aesthetic qualities and innovative spirit [4].

3.2. Innovation of "dual-engine driven" teaching model in basic three-dimensional animation teaching

Firstly, VR animation technology enables the visualization of teaching content. By overcoming the limitations of traditional blackboard teaching, VR animation digital interaction technology transforms abstract and complex 3D animation knowledge into vivid and intuitive 3D animation demonstrations, greatly enhancing students' learning interest and exploration enthusiasm. With the assistance of VR technology and the integration of rich materials from Guangzhou folk art, not only does it enhance the attractiveness of practical projects, but it also inspires students to incorporate traditional cultural elements into their creations, promoting a deep understanding and inheritance of Guangzhou folk culture [5].

Secondly, the VR interaction system leads to the reconstruction of the teaching framework. By innovating the existing teaching syllabus, a new teaching framework based on VR interaction technology is constructed, providing students with an immersive learning and practical environment. Within this framework, students can choose their learning paths and course content based on personal interests and ability characteristics, achieving a personalized learning experience. Simultaneously, utilizing VR to simulate 3D scenes for practical skill drills effectively enhances students' practical skills and cognitive abilities, significantly reducing the consumption of time and space in traditional teaching.

Thirdly, VR simulation scenarios optimize the classroom testing experience. Relying on the VR interaction system, highly realistic classroom testing simulation scenarios are developed, enabling students to personally experience the process of verifying their learning achievements in a virtual environment. By setting clear learning goals, students are guided to utilize visual and tactile senses to perceive scene changes in the VR environment, achieving hypertextuality and virtual perception interactivity in the testing process. This enhances students' mastery and application abilities of the course content [6].

Fourthly, the "dual-engine driven" approach explores the expansion of folk art practices. In students' ability expansion training, folk art is regarded as the core expansion direction. Students are encouraged to independently carry out expansion research and practical projects related to folk art, utilizing innovative thinking that combines technology and art. This teaching model not only promotes the comprehensive ability improvement of students but also effectively drives the inheritance and development of Guangzhou folk

art, providing strong support for the construction of a new education model that deeply integrates industry, education, and research.

3.3. Integrated application of book design and technology

Interaction design, as an important means of utilizing computer technology to optimize the human reading experience, has given rise to a new publishing form called interactive functional books in the field of book design. These books cleverly integrate signal pickups and interaction controllers, utilizing wired or wireless signal transmission technology. Visual elements such as lines and colors are embedded in key content areas of the book to achieve instant interaction and feedback with readers. Considering the rich connotation and unique charm of Guangzhou's folk culture, bookbinding design requires a careful conception of the layout of elements such as covers, inner page illustrations, and changes in color and shape. This aims to construct an interactive book system with distinct artistic characteristics of Guangzhou's folk culture [7].

Based on the rich resources of Guangzhou's folk culture, taking the book "Guangzhou Lingnan Garden Art" as an example, interaction touchpoints and feedback zones can be set on the "stone lion" sculpture graphics in the garden. Readers can lightly touch these points to watch video introductions of the stone lion carving process. In the book "Guangzhou Cantonese Opera Costume Culture", network services and interaction controllers can be integrated into the exquisite patterns of the costumes. This allows readers to deeply understand the cultural connotation and craftsmanship behind the costumes while appreciating their beauty. During the layout and post-press processing of interactive books, careful planning of the layout of touchpoints and feedback zones is required to ensure that they meet aesthetic needs, are convenient for practical operation, and closely fit the overall atmosphere and context of Guangzhou's folk art and culture. This comprehensively enhances the overall reading experience of the book system.

3.4. Enhancing folk art experience to improve the professional quality of teachers and students

In exploring art and design education in Guangzhou universities, deep experiential learning of Guangzhou's folk art serves as a core element. This is an important strategy to highlight the unique contribution of higher vocational education in protecting and inheriting local artistic culture. For educators, the primary task is to deeply explore Guangzhou's historical districts that are rich in marketplace culture and strong folk atmosphere, such as the simplicity of Enning Road, the exotic charm of Shamian Island, the waterside charm of Litchi Bay, and the creative rebirth of Yongqing Fang. From these explorations, representative elements of Guangzhou's folk art can be extracted and systematically integrated into teaching materials and frameworks. Simultaneously, teachers should actively plan and organize field trips and on-site sketching activities, guiding students to directly encounter the dazzling brilliance of Guangzhou's folk arts and crafts and the essence of traditional craftsmanship. This allows students to perceive their unique charm and ingenious creativity through personal experience. Subsequently, through detailed aesthetic analysis of these folk art elements, exploration of symbolic implications, and interpretation of folk backgrounds, the valuable experiences from field trips can be deeply integrated with classroom theoretical teaching. This stimulates students' innovative thinking and guides them to participate in redesign practices based on Guangzhou's folk art, transforming the learning process into a cultural journey full of creativity and inspiration. For students, studying in Guangzhou provides a platform to deeply understand and become familiar with the unique style of Guangzhou's folk

art. Through cross-regional and cross-cultural comparative analysis, especially contrasting with the folk art of their hometowns in terms of expression, color use, spatial layout, etc., students can not only broaden their cognitive boundaries of Chinese folk art but also deepen their understanding of the individuality of Guangzhou's folk art through careful comparison. This process not only enriches teaching content but also provides strong support for differentiated teaching, effectively promoting the dual improvement of teachers' and students' humanistic literacy and design abilities. Finally, the design works of teachers and students will naturally integrate Guangzhou's regional characteristics, exhibiting unique artistic charm.

4. Conclusion

In summary, within the wave of digital transformation in basic three-dimensional animation course teaching, the introduction of VR animation digital interaction technology and the construction of a "dual-engine" innovative teaching model have completely revolutionized traditional unidirectional teaching methods. This enables students to achieve seamless integration of learning and practice in a highly immersive VR environment. Using Guangzhou's folk art as a vivid case study for teaching and research not only greatly enhances the artistic reproduction capabilities of teaching but also promotes close cooperation and mutual improvement among industry, academia, and research. The innovative application of animation digital interaction technology has opened up a new path for the visual presentation and sensory experience of folk art, greatly enriching its communication media and forms of expression. With this technology, the realization of synchronous 3D animation visual transformation marks that animation professional teaching is moving towards a more three-dimensional, intuitive, and intelligent new era. The deep integration of VR animation digital interaction technology and Guangzhou's folk art, as a key means of cultural communication in the new media era, is powerfully pushing forward the in-depth progress of teaching reform, and its potential value is immeasurable.

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