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DIGITAL DESIGN TECHNOLOGIES IN CREATING AN INTERACTIVE NARRATIVE IN THE MUSEUM SPACE

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Abstract. *The purpose* of the article is to explore the potential of digital cultural and creative innovations, to analyse the latest approaches to solving the problem of presenting artistic and cultural heritage in the museum space using digital technologies.

Methodology. *In this research work, a mixed research methodology was utilized in conjunction with the research objectives and research questions. The primary research approach integrates both quantitative and qualitative methods, ensuring a comprehensive and nuanced understanding of the local culture-infused digital cultural and creative (DCC) designs.*

Results. *Explored the possibilities of applying interactive narrative theory to the design of localised digital cultural and creative products. The focus is on addressing the problem of cultural localisation, developing a combined empirical and theoretical research framework, identifying and analysing factors influencing digital cultural and creative design, and providing theoretical guidance for the localisation of digital cultural and creative products. It is emphasised that design products such as digital projection images, interactive elements, videos, etc. in combination with musical accompaniment can demonstrate the rich cultural heritage of China through the transformation of space and changes in light and shadow, and integrate a large amount of information.*

Scientific novelty: *The possibilities of effective application of the theory of interactive narrative in the development of localised digital cultural and creative products, namely museum locations using digital technologies are analysed.*

Practical relevance. *On the example of museum locations in China - Pingshan exhibition hall, Chongqing Times Museum, the Tianmen Site Museum, etc., the key factors of digital design and the possibilities of digital localisation of historical and cultural heritage are considered.*

Keywords: *interactive technologies, digital technologies, graphic design, theory of interactive narrative, museum location, digital product, art heritage.*

INTRODUCTION

In the context of the rapid development of digital technology, the inheritance and innovation of cultural heritage are undergoing an unprecedented paradigm shift. As the core carrier of

cultural memory, museums are gradually shifting from "exhibition of objects" to "reconstruction of narrative", and the intervention of digital means provides a key path for this transformation. Especially under the promotion of China's

"cultural power" strategy, enabling cultural creativity with technology and activating historical narrative with interaction has become an important practice direction in the field of museums.

ANALYSIS OF PREVIOUS STUDIES

Digital Culture Industry Booming in the Age of Artificial Intelligence. With the advancement of digital information technology, the empowerment of traditional culture through digital means has become a topic of keen societal interest [6]. In the realm of global economic development, the cultural and creative industries are universally acknowledged for their vast potential. China's cultural and creative sector, enriched with profound cultural heritage and cutting-edge information technology, is witnessing an exponential growth in its digital cultural creations [12]. With the increasing sophistication of smart technologies, the impact of digital cultural innovation is expanding significantly. According to the "14th Five-Year Plan," the cultural industry is poised to become a cornerstone of the national economy, underscoring its strategic importance [13]. In June 2022, the General Office of the CPC Central Committee and the General Office of the State Council issued the "Opinions on Promoting the Implementation of the National Cultural Digitalization Strategy," which advocates for the development of new digital cultural consumption scenarios and promotes integrated online and offline digital cultural experiences [11].

Cultural creation is a forward-looking approach to cultural production and dissemination. Through years of practical experience, China's cultural and creative industries have shown tremendous potential. The rapid development of the internet has presented new opportunities for the industry, fostering cultural digitalization and driving the transformation and upgrading of cultural consumption. Artificial intelligence (AI) has propelled digitalization into a new era, bringing unprecedented changes to human life and exerting profound impacts across various sectors [8]. As an essential component of information technology, AI is set to deeply influence traditional media and artistic creation. The application of AI in the arts is not a recent phenomenon; for instance, in 2017, the Qin Shihuang Mausoleum Museum partnered with Tencent to launch interactive digital programs such as "Digital Qinling" and "Tracing the Mausoleum of the First Emperor" [15].

With the evolution of the internet, AI has developed over the past six decades, becoming a crucial player in various domains. Technologies like machine learning and augmented reality have provided new forms of expression for traditional culture and opened new avenues for the cultural and creative industries' growth. The integration of

these technologies has driven innovative, large-scale, intensive, and technologically advanced developments in the economic progress of traditional culture, making them indispensable in the cultural creation process. As the cultural industry moves towards greater refinement and personalization, the new cultural and creative economy is set for a phase of concentrated development [2]. The forthcoming fourth industrial revolution will inject new momentum into the innovative development of the cultural and creative industries, driving the personalization of digital cultural demands. The integration of digital technology will enable the cultural and creative industries to embrace AI technologies fully, achieving a harmonious fusion of technology and culture.

Significant progress has been made in China in the fields of cultural and creative product development and cultural revival. Despite these advancements, there remain areas for improvement in terms of cultural depth, product innovation, and user experience.

PURPOSE

The purpose of the article is to investigate the application of interactive narrative theory in the design of localized digital cultural and creative products, addressing the challenges of cultural localization and enhancing traditional cultural and creative design.

RESULTS AND DISCUSSION

Research indicates that the trend of applying new information technologies in cultural and creative design is emerging. Consequently, this study proposes a localized design strategy for digital cultural and creative products based on interactive narrative theory to address the challenges faced in the localization of cultural and creative design and to mitigate the shortcomings of traditional cultural and creative design.

Furthermore, in the context of the rapid development of artificial intelligence, interactive technologies have seen significant advancements. Technologies such as simulation and emotion recognition have enabled computers to respond to human emotions and interact naturally with humans. Currently, research on the localized design of digital cultural and creative products is primarily focused on usability and user experience, lacking exploration of the integration of localized cultural and creative design with digital technology and narrative pathways. Through research on museums, it is found that combining empirical and theoretical research methods can identify and analyze relevant factors in digital cultural and creative design. These insights, guided by narrative theory, can provide critical theoretical support for

exploring the localized design of digital cultural and creative products.

Based on the above research objectives, this study proposes the following research questions:

1. How can interactive narrative theory be effectively applied in the design of localized digital cultural and creative products to address the challenges of cultural localization and enhance traditional cultural and creative design?

2. What are the key factors influencing digital cultural and creative design, and how can a combined empirical and theoretical research framework be developed to provide theoretical guidance for the localization of digital cultural and creative products?

Interactive experiences become a new trend in digital literature. The development of cultural and creative products has become increasingly relevant in today's context, reflecting the growing demand for cultural diversity. Traditional cultural and creative products often suffer from homogeneity and lack unique cultural appeal, making it challenging for consumers to appreciate their distinct cultural content. According to Masayuki Kurokawa, the era of direct personal access to global information has arrived, and design elements such as form are no longer constrained by functionality [1]. Therefore, the design of cultural and creative products should incorporate technological elements, adapting to contemporary trends and integrating with technology to present new aesthetics.

With the support of technology, there will be an increasing number of practices involving the integration of digital technology into cultural dissemination. As cultural industry consumption upgrades, the demand for digital experience-oriented cultural and creative products will significantly rise. In the context of the experience economy and cultural empowerment, the integration of regional culture into cultural and creative design accelerates the infusion of technology into these designs. Digital experience projects are continually emerging, and new interactive cultural and creative experience services are deepening their application in the creation of regional cultural and museum construction projects [10].

The advancement of interactive technology allows traditional culture to transcend geographical and temporal boundaries, providing a more convenient platform for sharing traditional cultural creations and research results. This promotes active participation in cultural innovation, transforming individuals into active participants in traditional culture. Enhanced interaction with cultural works fosters an immersive experience. "People-oriented" approaches drive

the exploration of new functionalities and the expansion into new fields of digital development. Interactive technology democratizes cultural consumption, enabling broader access to culture, especially Chinese traditional culture, for the general public [9]. The application of interactive technology brings culture closer to people's lives, serving them better and guiding them toward a more promising future.

Localized design of digital cultural creation is a new path to activate local cultural consumption and cultural inheritance

In the development of human society, traditional culture has always been a representation of the elements of civilization and historical memory, serving as a continuation of human civilizational achievements. Cultural resources are essential for cultural life and production, acting as a unique resource that naturally sources cultural materials from specific periods and regions. These resources encompass various aspects such as folk customs, historical records, information, and knowledge. Cultural resources exist both in symbolic and material forms, as well as in intellectual and imaginative forms [16].

Empowered by digital technology, cultural consumption is being revitalized. Tencent Cultural Tourism leverages new internet technologies such as cloud computing and artificial intelligence to launch numerous service projects, including the "Home in Henan: Gift of the Yellow River" Intangible Cultural Heritage Data Museum and the "Grand Canal National Cultural Theme Park Data Cloud Stage". The "Intangible Cultural Heritage Data Museum" aims to promote Yellow River culture and narrate its development history. Through platforms like mini-programs and short video dissemination, it explores the intangible cultural heritage resources of nine cities along the lower Yellow River in Henan Province [4]. By utilizing Tencent's technological innovations, marketing strategies, and IP resources, it has established an internet-based digital trading platform. This initiative aims to enhance public awareness of the traditional culture of the Yellow River, promote the spirit of the Yellow River, and deeply embed its stories in the public consciousness.

The theory of interactive narrative, originally rooted in narratology, has evolved into a novel storytelling method propelled by advancements in digital technology [5]. Initially, most research in this field focused on the realms of film and television. In recent years, however, there has been an increasing interest in the study of interactive narrative within the discipline of design, particularly with the advent of interactive

technologies. Consequently, this study will also consider interactive installations in physical spaces.

Although research on localized design of cultural and creative products has been approached from multiple disciplinary perspectives, many studies still fail to fully capitalize on innovation, especially in the application of new technologies. While a few scholars have begun to focus on "digital cultural and creative products," most research remains limited to simple video presentations and lacks in-depth exploration of the diverse forms of digital cultural and creative expressions. Current practices in art exhibitions demonstrate the incorporation of multimedia and artificial intelligence technologies, highlighting the outdated notions in the localized design of cultural and creative products that have not yet fully integrated into the broader context of digitalization [14].

Museums, as representative carriers of regional culture, embody the historical and cultural heritage of an area. The innovation and development of museum cultural and creative products can significantly contribute to the digitalization of localized design in the cultural and creative industries.

Digital cultural and creative products, as an emerging form within the cultural and creative industries amidst the wave of digital technology, are gradually becoming a vital force driving global cultural innovation and economic development [7]. In China, particularly, their rapid development and the resultant cultural and economic effects cannot be underestimated. This phenomenon has profoundly reshaped the production, consumption, and dissemination models of traditional Chinese culture, exerting a profound influence on the country's economic structure, cultural ecology, and overall development trajectory, thereby attracting widespread attention and in-depth research from both academia and industry.

Currently, in cultural industry-related content fields and draft documents, concepts such as "digital cultural and creative," "digital cultural and creative industry," "digital cultural and creative products," and "digitization of cultural and creative" are often used interchangeably, with no universally accepted and authoritative definition among academics. However, from a linguistic perspective, digital cultural and creative products are essentially the digital expressions of cultural and creative content, constituting a specialized segment within the digital cultural and creative industry [3].

Academician Pan Yunhe of the Chinese Academy of Engineering has defined the digital cultural and creative industry as "a fusion of

creative content and creative manufacturing driven by digital technology," where creative content industries encompass digital cultural and creative products presented on mobile internet platforms, emphasizing the integration of technology and content. Meanwhile, Professor Lu Rui from Tianjin Academy of Fine Arts, from a cultural communication perspective, views digital cultural and creative products as innovative vehicles for promoting China's distinctive culture, enriching lifestyles, and enhancing educational experiences. These products aim to captivate younger audiences by adopting storytelling and entertainment elements, highlighting the integration of digital technology and engaging education within cultural and creative products.

Concurrently, the business sector has also grasped the immense potential of digital cultural and creative developments, continuously introducing new concepts and development strategies. Tencent's concept of "Neo-Culture and Creativity" emphasizes the utilization of emerging technologies to facilitate the production and service enhancement of digital cultural and creative products, upgrading digital culture from mere content presentation to a holistic experience, with a particular focus on shaping and upgrading IPs imbued with traditional Chinese cultural values. Similarly, Alipay's "Jingtian APP" for digital cultural and creative collectibles leverages blockchain technology to provide unique digital identities for specific digital works, art pieces, and commodities.

In summary, digital cultural and creative products can be defined as comprehensive content products that rely on new media technology as a medium, are deeply rooted in the cultivation of cultural IPs, and center on creative content, encompassing creation, production, dissemination, and service. They represent the transformation and upgrading of traditional cultural and creative products in the digital era, leveraging digital technology and diverse media platforms to transform cultural content from tangible to virtual spaces, thereby expanding the exhibition channels for cultural and creative products. Like traditional cultural and creative products, they still prioritize cultural connotations and draw inspiration from localized content. However, digital cultural and creative products distinguish themselves through their heightened sense of immersion and interactivity, enriching the expression of cultural creativity and pointing to a new direction for the future development of the cultural and creative industries.

The concept of "locality" in the cultural context of Taiwan, China, profoundly embodies the intersection of time and space, where "in"

conveys the immediacy and presence, while "locality" broadly refers to geographical spaces, ranging from specific venues to broader regional contexts. This concept not only defines physical locations but also accentuates the uniqueness and salience of local cultures, which are endowed with symbolic meanings in the environment, becoming vital markers of regional identity.

The idea of "localization" originated in architectural design and has subsequently expanded into broader domains, evolving into a strategy that highlights regional characteristics and cultural depth. It transcends mere spatial planning, delving into the integration of local history, culture, and social fabrics, and expresses these elements through design languages, fostering an innovative yet rooted holistic aesthetic.

Within the realm of Cultural and Creative Industries (CCI), the trend of localization has gained prominence, propelling cultural and creative products beyond functional requirements to emphasize the excavation and presentation of cultural connotations, often transforming them into tangible embodiments of regional image and cultural identity. This transformation signifies a profound shift towards personalization and localization in CCI, enriching products with profound humanistic values and local characteristics.

Incorporating locality into Digital Cultural and Creative Design (DCCD) holds profound implications for the preservation and innovation of regional cultural identities. From an academic perspective on cultural transmission, locality serves as a crucial bridge connecting the past with the present and facilitating cultural exchange and fusion. By deeply exploring local natural environments and human landscapes, and integrating unique cultural symbols and regional characteristics, digital creative designs can effectively transmit and celebrate local histories and cultural heritages, realizing the digital recreation and widespread dissemination of cultural values.

Within this framework, DCCD guided by the principle of localization strives not only for technological innovation and design excellence but also for fostering emotional resonance and value recognition among users towards local cultures amidst the increasingly intertwined landscape of localization and consumer culture. Through the masterful application of design languages, a bond is forged between digital creative products and cultural audiences, revitalizing cultural expressions in the digital era with renewed vitality and relevance.

Design practice. Empowered by digital

technology, cultural consumption is being revitalized. Tencent Cultural Tourism leverages new internet technologies such as cloud computing and artificial intelligence to launch numerous service projects, including the "Home in Henan: Gift of the Yellow River" Intangible Cultural Heritage Data Museum and the "Grand Canal National Cultural Theme Park Data Cloud Stage." The "Intangible Cultural Heritage Data Museum" aims to promote Yellow River culture and narrate its development history.



Fig. 1. The exhibition space "Painting by Dali" in the Pingshan exhibition hall, China, 2024 [17]



Fig. 2. Works by artist Tian Xiaolei. Chongqing Times Museum, China, 2024 [18]

At Figure 1 – the exhibition carefully selected Dali's 32 classic paintings, and reshaped more than 400 artificial intelligence creations with advanced AI technology, combining surrealism, cubism, dreams and science to create countless magical visual worlds and release various potentials of art, in order to pay tribute to Dali [17].

At Figure 2 – the artist Miao Xiaochun's works are the largest in volume and are divided into three parts: digital projection image, sculpture and easel painting. In the image, a

recognizable and slightly abrupt digital figure is constantly doing a series of movements, sometimes tumbling, sometimes jumping and walking. The difference is that these common movements in daily life are processed by layer-by-layer software. It became as weird and strange as extraterrestrial life. This series of works, titled "Top Dance", is a digital body full of metaphors and multiple narratives constructed by Miao Xiaochun, hoping to arouse the audience's deep thinking about the future existence of human beings and personal destiny [17].

Through platforms like mini-programs and short video dissemination, it explores the intangible cultural heritage resources of nine cities along the lower Yellow River in Henan Province [4]. By utilizing Tencent's technological innovations, marketing strategies, and IP resources, it has established an internet-based digital trading platform. This initiative aims to enhance public awareness of the traditional culture of the Yellow River, promote the spirit of the Yellow River, and deeply embed its stories in the public consciousness.

At Figure 3 – the Tianmen Site Museum of Luoyang City in Sui and Tang Dynasties is a good case of situational co-creation. As one of the famous "seven-day buildings" on the central architectural complex of Luoyang City, the capital of Sui and Tang Dynasties, it is also a very important place for diplomatic interaction in history. On the basis of the original site, the whole design restores the historical style to the

maximum extent. The combination of art and technology on the one hand strengthens the cultural connotation of the site and highlights the history, culture and artistic value of Yingtianmen. On the other hand, the large-scale architectural projection show "Dream of the Yellow River" aims to create a national style and fashion cultural tourism. Divided into three chapters of "origin", "inheritance" and "display", it leads the audience into the Ying Tianmen and tells the legend of light and shadow behind the Sui and Tang Dynasties. The image content is based on the structural characteristics of Sui and Tang buildings, combined with the progressive musical melody and rhythm, and shows the rich cultural heritage through space transformation and light and shadow changes. While respecting architectural aesthetics, it also naturally integrates a large number of ancient and modern cultural elements of Luoyang, telling the multicultural charm of Luoyang as a representative of Chinese civilization.

At Figure 4 – just like the Nanjing Da Bao 'en Temple Site Museum, it sets a specific narrative scene for the audience, and the audience feels the scene information according to their own experience in the space, and is immersed in the situation of blending the virtual and real. From space to narrative and then extended to emotion, the real site scene is integrated with the story telling, and the audience is immersed in the time and space situation through the interactive technology and the atmosphere creation of sound

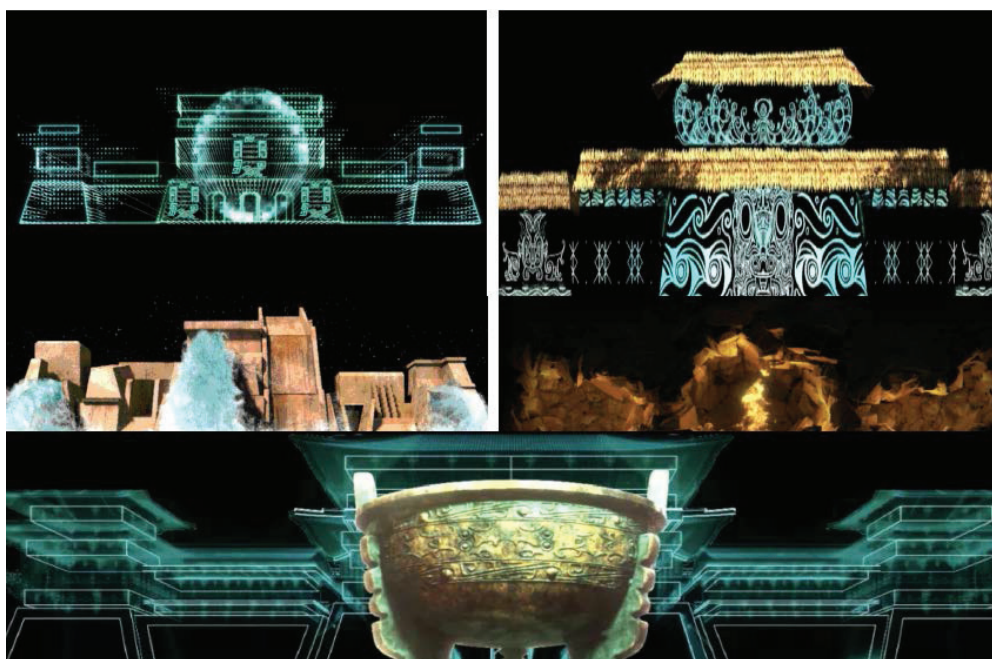


Fig. 3. Ying Tianmen Site Museum "Ying Everlasting Song" [19]

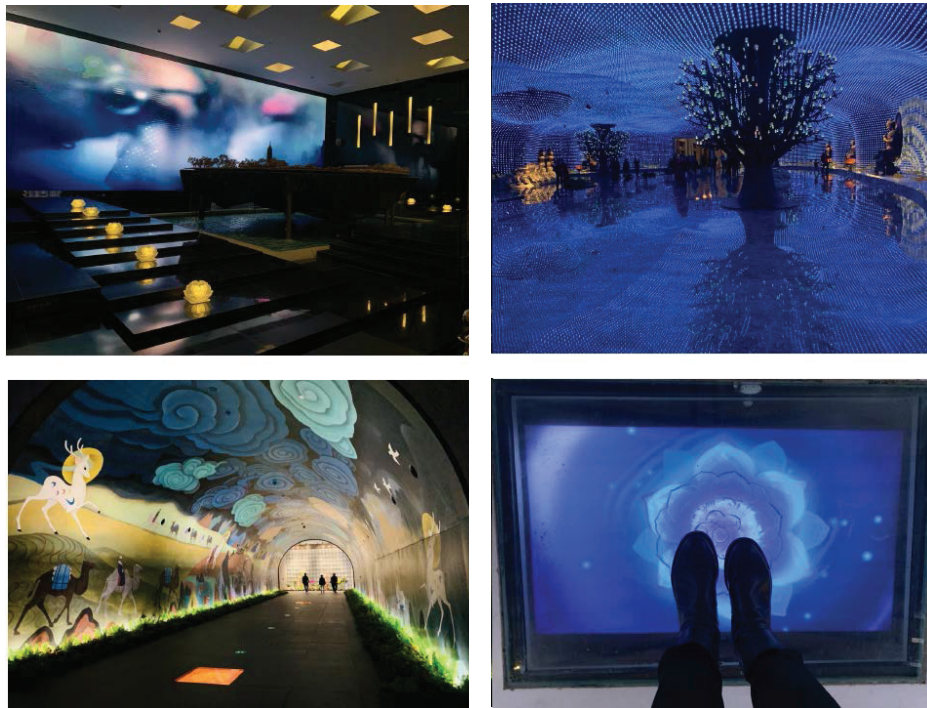


Fig. 4. Design Museum in Copenhagen, Denmark [20]

and electricity. The audience can understand the meaning of specific symbols in a specific space, and generate spatial translation, and vivid stories can arouse the empathy and resonance of visitors, realize emotional communication, and strengthen cultural identity and self-confidence.

At Figure 5 – riverside during the Qingming Festival on display at the China Pavilion at the 2010 Shanghai World Expo. On the basis of the original Northern Song Dynasty Zhang Etudian's famous painting "Qingming River Map", comprehensive use of various ultra-high-definition digital technologies at that time, dynamic restoration of the bustling Northern Song street scenes, it uses 8K ultra-high-definition digital technology, 4D dynamic image, Whether it is the sound of people on the bridge, the shouts of mooring boats, the sound of chariots and horses, the sound of Shouting, and the non-linear narrative context, all attract the audience to stop and stay,

completely immersed in the multi-sensory and multi-level art feast of "standing in the green Yang shade, the restaurant March Spring".

CONCLUSIONS

At present, more and more museums and exhibition halls are combined with digital technology, and the exhibition design of museums has undergone new changes. The development of artificial intelligence has been unstoppable, and digital technology has profoundly affected the way people live their daily lives. This topic takes the interactive narrative theory as the starting point, sorts out the development vein of interactive narrative, summarizes the fulcrum and structure of interactive narrative, and summarizes the process of interactive narrative through comparative analysis of cases. On the basis of the existing interactive narrative model, it further deduces the level of digital cultural creation



Fig. 5. "Riverside Scene at Qingming Festival" at the China Pavilion of Shanghai World Expo [21]

in local design by integrating the five elements of interactive design. Users are both users and creators of digital cultural creation, so the research and mining of user needs is essential, and the design points of digital cultural creation are summarized through in-depth interviews and questionnaires. From the perspective of the combination of methodology and practice, this paper puts forward the specific strategy of digital cultural creativity in local design, including four aspects: cultural theme establishment, interaction node and structure design, media selection and collaborative technology, and visual shaping, which basically covers all aspects of digital cultural creativity in local design. Finally, the Yellow River Museum is taken as an example to carry out design practice.

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АНОТАЦІЯ

Ван Шуанху, Кротова Т. Цифрові дизайн-технології у створенні інтерактивного наративу в музейному просторі

Мета статті – дослідити потенціал цифрових культурних і творчих інновацій, проаналізувати новітні підходи на вирішення проблеми презентації мистецької і культурної спадщини в музейному просторі засобами цифрових технологій.

Методологія. У цій дослідницькій роботі було використано змішану методологію у поєднанні з дослідницькими цілями та питаннями. Основний дослідницький підхід поєднує як кількісні, так і якісні методи, забезпечуючи всебічне та нюансоване розуміння цифрових культурних та креативних (ЦКК) проєктів.

Результати. Досліджено можливості застосування теорії інтерактивного наративу в дизайні локалізованих цифрових культурних і креативних продуктів. Основна увага зосереджена на вирішенні проблеми культурної локалізації, розробці комбінованої емпіричної та теоретичної бази дослідження, виявленні та аналізі факторів, що впливають на цифровий культурний і креативний дизайн, а також наданні теоретичних рекомендацій щодо локалізації цифрових культурних і креативних продуктів. Наголошено, що такі дизайн-продукти, як цифрове проєкційне зображення, інтерактивні елементи, відеороліки та ін. у поєднанні із музичним супроводом здатні продемонструвати багату культурну спадщину Китаю через трансформацію простору та зміни світла і тіні, інтегрувати велику кількість інформації.

Наукова новизна. Проаналізовано можливості ефективного застосування теорії інтерактивного наративу в розробці локалізованих цифрових культурних і креативних продуктів, а саме музейних локацій з використанням цифрових технологій.

Практична значущість. На прикладі музейних локацій Китаю – виставкової зали Піншань, Музею часів Чунціна, Музею місця Тяньмень та ін. – розглянуто ключові чинники цифрового дизайну та можливості цифрової локалізації історико-культурної спадщини.

Ключові слова: інтерактивні технології, цифрові технології, графічний дизайн, теорія інтерактивного наративу, музейна локація, цифровий продукт, мистецька спадщина.

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