From Technics to Culture: Digital Preservation and the Mediatization of Cultural Heritage

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Abstract. This study examines the application and impact of digital technologies in cultural heritage preservation and transmission. Employing a comparative case study methodology, the research analyzes two distinct cases: the Dunhuang cultural heritage ecosystem and Black Myth: Wukong. The study explores the integration of modern digital technologies with cultural heritage, analyzing their technical applications, exhibition and dissemination modes, and the effects of digital preservation on heritage transmission. Findings reveal divergent logics of heritage preservation across different media. Both cases manifest a structural shift from material conservation to experiential reproduction, destabilizing conventional binaries of tangible and intangible heritage.

Keywords: cultural heritage, digital preservation and inheritance, technology and culture

1 Introduction

The 17th Session of the General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO), held in Paris from October 17 to November 21, 1972, adopted the Convention Concerning the Protection of the World Cultural and Natural Heritage. The first chapter of the Convention elaborates on the concepts of cultural heritage and natural heritage. The term "cultural heritage" refers to monuments, groups of buildings, and sites of outstanding universal value from the perspectives of history, art, science, or anthropology.

In 1989, the 25th Session of the UNESCO General Conference adopted the Recommendation on the Safeguarding of Traditional and Folk Culture. Subsequently, the UNESCO General Conference successively adopted a series of international standard instruments for the protection of intangible cultural heritage. Eventually, the Convention for the Safeguarding of the Intangible Cultural Heritage was passed at its 32nd Session in 2003.

The earliest origin of the concept of "cultural heritage" can be traced back to "cultural property". The term "cultural property" was first introduced in the Convention for the Protection of Cultural Property in the Event of Armed Conflict promulgated by

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UNESCO in 1954. In the Hague Convention, cultural property is defined as immovable or movable property of great importance to the cultural heritage of all peoples. It specifically includes religious and secular sites, archaeological sites, architectural complexes, collections, manuscripts, books, and archives. The 1970 Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property also adopted the term "cultural property". Nevertheless, the term "cultural heritage" appeared in this Convention for the first time, bearing only abstract connotations as a general collective concept of cultural property without specific legal implications.

In the second half of the 20th century, the expression "cultural property" was gradually replaced by the concept of "cultural heritage". Although the term "cultural heritage" first emerged in the 1954 Hague Convention, it was further developed in the Convention Concerning the Protection of the World Cultural and Natural Heritage. In 1972, this international convention officially established "cultural heritage" as a direct object of protection and formulated a clear conceptual definition for it. Since then, terms including "cultural property", "cultural heritage", and "cultural relics" have been used interchangeably in legal documents issued by international organizations.

Existing scholarship has predominantly focused on either the archival approaches of technological application or the analysis of industrial effects, failing to adequately address how digital technologies reconstruct the ontological existence and transmission mechanisms of cultural heritage. Taking this gap as the point of departure, this study explores new pathways for cultural heritage transmission amid media transformation.

Based on the classic Chinese literary masterpiece Journey to the West, Black Myth: Wukong innovatively interprets this classic story in the game world through the in-depth integration of modern game technology and traditional culture (Wang, 2024). As the "first shot" of the first-mover economy in China's AAA game market, it has not only achieved a win-win situation of exporting excellent traditional Chinese culture and generating economic benefits online, but also collaborated with Shanxi's cultural and tourism sector offline to design relevant cultural and tourism routes, creating a new model for the development of the tourism economy (Dou, 2025).

2 The Integration of Modern Digital Technology and Cultural Heritage

2.1 Digital Preservation of Dunhuang Cultural Heritage

The Dunhuang Academy began its research on digital preservation technology for grotto art in 1993, aiming to permanently preserve the precious materials of Dunhuang Grotto art with high fidelity by using computer digital technology. Digital storytelling has brought revolutionary changes to the preservation and dissemination of cultural heritage by integrating Virtual Reality (VR) and Augmented Reality (AR). VR offers a fully immersive environment that transports users to different times and places, while AR overlays digital information onto the real world, enhancing interaction with the physical environment. This dual approach enriches storytelling, fosters emotional

connections and active participation, thus transforming users from passive observers into co-creators of cultural narratives (Adewojo, 2025).

The design of digital interactive technology can be divided into two categories: digital virtual image interaction and intelligent perception interaction. Leveraging digital technologies, the Cloud Tour of Dunhuang mini-program enables users to engage in immersive interactions with Dunhuang culture online. Within the program, the "Digital Library Cave" project adopts multi-level interactive design, allowing users to learn about the history and culture of the Library Cave through experiential participation.

Interactive digital technologies significantly enhance users' immersive experience. In terms of spatial immersion, the mini-program applies high-definition digital scanning and 3D modeling to construct a high-precision, 1:1 millimeter-level digital twin of cultural heritage in the virtual space. Users are allowed to move freely, explore scenes and engage in interactive operations, thereby recognizing the historical value of Dunhuang culture through embodied spatial immersion. In terms of temporal immersion, the Cloud Tour of Dunhuang adopts a dual temporal logic to create cross-time immersion. It allows users to travel across the Late Tang Dynasty, the Northern Song Dynasty, the late Qing Dynasty and other historical periods in the virtual environment, and perceive the inheritance and evolution of Dunhuang culture through the flow of time.

Panoramic roaming technology collects image information of scenes or objects through on-site shooting. It aims to construct virtual environments with real images, so as to fully record and reproduce real on-site conditions. Widely applied in relic restoration, museum guidance, cultural relic interpretation and other fields, this technology has also been extended to online access scenarios. It realizes the three-dimensional display of historical sites, provides route navigation maps, and presents cultural relics in detail, enabling the public to gain an immersive visiting experience without being physically present.Panoramic roaming technology plays a vital role in the protection and inheritance of cultural heritage such as the Mogao Grottoes in Dunhuang. With this technology, murals, sculptures and other cultural relics of the Dunhuang Mogao Grottoes are captured and produced into panoramic images at a horizontal 360° and vertical 180° viewing angle, achieving a complete restoration and presentation of real scenes.

The integration of animation technology with diverse art forms, especially in the digitalization of traditional culture, demonstrates the unique charm of digital exhibitions and exerts a profound influence on the development of traditional culture. In recent years, China's animation industry has achieved remarkable accomplishments, enriching the domestic market and contributing Chinese wisdom to the global art of animation.

On April 13, 2020, the Dunhuang Animated Series was released. Created based on the murals of the Mogao Grottoes, this work was supported by the Dunhuang Academy, Tencent Pictures, Tencent Animation and other institutions (Luo, S. W., 2022). Consisting of five episodes with a duration of five minutes each, the series features diverse themes while maintaining a unified aesthetic style. The success of the Dunhuang Animated Series marks a new milestone for China's animation industry and

offers valuable references for the digital inheritance of cultural heritage. With the continuous advancement of digital technology, animation art will play an increasingly significant role worldwide, injecting vitality into the inheritance and innovation of human culture.

The design of "digital interactive technology" can be divided into two categories: digital and virtual image interaction, and intelligent perception interaction. The mini program "Cloud Tour Dunhuang" uses digital technology to enable users to have an immersive interaction with Dunhuang culture online. The "Digital Scripture Cave" project in "Cloud Tour Dunhuang" helps users understand the history and culture of the Scripture Cave through practice with multi-level interactive design. Interactive digital technology enhances the immersive experience of the program.

Since the early 20th century, the digitalization of Dunhuang documents has gradually become an important issue in the international academic community. Established by the British Library in 1994, the International Dunhuang Project (IDP) is a landmark achievement in the digitalization of Dunhuang documents, involving 22 institutions from 12 countries, including the National Library of China and the Dunhuang Academy of China (Figure 1). The IDP database provides information and images of all manuscripts, paintings, textiles and artworks from archaeological sites in Dunhuang and the eastern section of the Silk Road, and encourages their use in educational and research programs. As of October 2024, the database contains a total of 610,398 images, providing valuable materials for Dunhuang studies researchers worldwide.

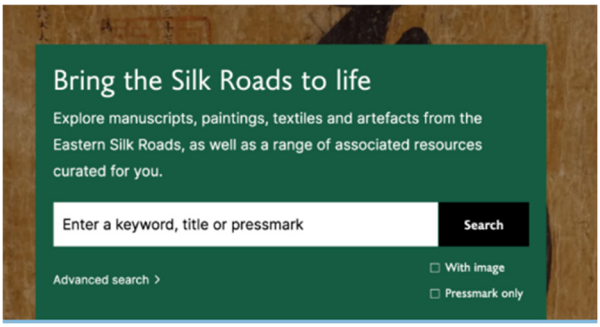

Fig. 1. International Dunhuang Project Database

2.2 Innovative Digital Preservation in Black Myth: Wukong

The main characters in Black Myth: Wukong such as Sun Wukong, Yang Jian and Bai Gujing are all derived from the classic images in Journey to the West.

Innovative Digital Storytelling.

Digital storytelling is generally understood as a form or method of storytelling using digital technologies and other multimedia forms. Essentially, it is a new narrative model emerging with the development of digital technology. Marie-Laure Ryan, a digital narratologist, divides digital storytelling into interactive novels, hypertext nov-

els, interactive dramas and video games containing narratives, among which video games are a typical representative of interactive entertainment forms in digital storytelling. In traditional narrative works, readers and audiences usually read and watch other people's stories from a spectator's perspective, also known as the third-person perspective. In the digital narrative environment, however, the narrative recipients usually play or control a certain role, experience the occurrence of the narrative in the first-person perspective as the protagonist, or observe the occurrence of the narrative as a spectator.

Innovative Interconnection of Digital Media.

In the sense of media interconnection, Black Myth: Wukong, as a representative work of China's game industry going global, is an open attempt to deeply embed Chinese cultural elements into modern game media (Chen, 2025). This is mainly reflected in Shanxi becoming a pilgrimage site to realize the media visibility of film and game integration. The material and spiritual connotations of regional culture have shaped the spatial structure of ancient Shanxi architecture, and various organizations, platforms and pilgrims of Black Myth: Wukong have taken joint actions. (Qi & Zhao, 2025). In terms of emotional connection, the game builds a deep emotional bond between players and Sun Wukong by allowing them to grow together with the character through wonderful plots and vivid character portrayal (Yang, 2024). Since then, the game has become an artistic carrier of emotional communication, and bullet comments have shown players' high recognition and eager expectation for the game. In terms of cultural resonance, the game skillfully integrates traditional culture with modern technology.

3 Results

Digital technology also makes the interpretation of cultural heritage more precise and personalized. Through hyperlink methods such as audio, video and web links, each knowledge point of cultural heritage can become a "knowledge tree" connecting massive information, meeting the needs of different audiences. The rapid development of digital technology and its in-depth integration with cultural heritage have created a new experience paradigm for tourists. However, to realize the transformation from technical application to behavioral retention, it is necessary to clarify the internal mechanism of digital experience internalized into stable and sustainable behavioral intentions. Table 1 presents the characteristics and impacts of contemporary digital culture from three dimensions: orientation, supply standards, and positive and negative impacts (Table 1) .

Table 1. Analysis of the Characteristics and Impacts of Contemporary Digital Culture

Section	Core Content
Three Orientations of Contemporary Digital Culture	Positivism, Utilitarianism, Entertainism
Three Supply Standards of Dig-	Rapid production speed; Entertaining content; Precise dissemination

Section	Core Content
ital Culture	
Positive Impacts of Digital Culture	Inject new vitality; Enhance affinity; Attract a wide audience
Negative Impacts of Digital Culture	Breed the unhealthy trend of "fast food culture"; Superficial and impetuous cultural products; Lack of in-depth connotation

4 Conclusions

The widespread application of digital technologies has opened up new paths for the preservation and inheritance of cultural heritage. Its successful practice in the preservation of Dunhuang cultural heritage and Shanxi heritage in Black Myth: Wukong has fully proved its great potential in the recording, preservation, restoration, display and dissemination of cultural heritage. In the future, it is necessary to further strengthen the in-depth application of digital technologies in cultural heritage preservation, promote international cooperation and exchange, and advance the standardization and institutionalization of digital preservation of cultural heritage.

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