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Rethinking Immersion in Digital Heritage: A Technology–Narrative–Emotion Framework for Cross-Media Cultural Communication

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Abstract

In the context of digitalization and media convergence, cultural heritage dissemination is being reshaped by immersive technologies such as VR, AR, AI-driven narratives, and digital twins. While existing research has explored visualization, interface design, and digital preservation methods, the underlying mechanism through which immersion is generated—particularly the dynamic interaction of technological structures, narrative organization, and emotional engagement—remains insufficiently theorized. To address this gap, this study examines immersive digital heritage as its core research object and employs a theoretical and conceptual analysis approach. Through the synthesis and integration of interdisciplinary scholarship, the study proposes a "technology–narrative–emotion" analytical framework to reveal how immersive experience emerges from the interplay between technical affordances, narrative restructuring, and users' affective responses. The findings demonstrate that digital heritage immersion is not produced by any single factor but is constructed through continuous negotiation among technological mediation, narrative meaning-making, and emotional resonance. This process transforms cultural heritage from a static representation into a dynamic field of experiential interpretation. However, the analysis also identifies several risks: strengthened narrative authority induced by technological control, the hyperreal effect produced by high-fidelity visual restoration, and the potential reduction of complex historical memory into short-lived emotional peaks.

Keywords: immersive digital heritage, transmedia narrative, affective engagement, technological affordances, interpretive plurality

1. Introduction

The digitalization and convergence of media are transforming the methods of ethnicity distribution more radically than ever, which has an immense effect on the forms of cultural heritage management (Siliutina, I., Tytar, O., Barbash, M., Petrenko, N., & Yepyk, L., 2024). Conventional channels of dissemination, which are based on the physical display, the use of documentaries, and offline visits, are being stretched and changed by new technologies including virtual reality (VR), augmented reality (AR), AI narratives, digital twins, and the experience of the metaverse (Portalés, C., Rodrigues, J. M., Rodrigues Gonçalves, A., Alba, E., & Sebastián, J., 2018). It is neither a digital expression of historical memory nor anything like a digital representation of it, but a technological means to experience emotions and to be a part of culture and prove identity. Digital heritage, serving as the means to overcome the time and space boundaries, marked with multimodal presentation, real-time interaction, and contextualization, turns into more of an object to observe, rather than an experience of a cultural domain. However, the current innovation in the nature of cultural heritage dissemination through the channel of digital technology does not eliminate the fact that the existing research has also certain limitations. Most of the present scholarly debates revolve around aspects like technological visualization, interface design,

quantitative analysis of immersion by the user, authenticity of the narrative, digital preservation structures and reconstruction of cultural context (Siliutina, I., Tytar, O., Barbash, M., Petrenko, N., & Yepyk, L., 2024). Nevertheless, there is no systematic theoretical explanation of the underlying mechanisms, through which immersive experiences are produced based on interplay of the technological discourses and the processes of affectivity. This is especially so in the kind of transmedia communication, where the interplay between the technological changes, reformulation of narrative and the emotional reactions of the user have not been sufficiently condensed in an in-exhaustible theoretical framework.

It is on this basis that this paper critically examines the immersion process in the cross media delivery of digital heritage based on theoretical studies. This research paper will analyze the major directions in creating the immersive experience of digital heritage under the two perspectives of technological narrative and emotional connectivity. Through summary, comparison, and synthesis of existing theories, this paper would attempt to address the theoretical gap in the digital heritage studies of how the immersive experience works and offer a novel way of analysis to the narrative design and experience formation of the subsequent digital cultural dissemination.

2. Theoretical Framework

2.1 Technological Narrative

Technological narrative has its roots in the continuing investigation of the digital media studies in which technology redefines the narrative technique. The theoretical basis of this idea was provided by Manovich in his Database Narrative. He explained that digital media underlying structure is a database as opposed to the linear text; stories are no longer presented in the conventional chronological sequence but produced in the dynamic form of relationship between data (Hayles, N. K., 2007). Later on, Ryan extended the idea of Virtual Narrative Space to the point at which the narrative is executed as a spatialized representation in a virtual environment, and that it is through the collaborative efforts of the users that the narrative meaning is created via the process of entry-exploration-interaction (Ryan, M. L., 2015).

Technological narrative plays a significant role especially in the process of cross-media dissemination of digital heritage (Almeida, P., Teixeira, A., Velhinho, A., Raposo, R., Silva, T., & Pedro, L., 2024). First, using virtual reconstruction, technology as a paradigm of great precision in modeling, spatial overlay, and experiential visual presentation, re-tells the story of damaged, destroyed, or lost cultural heritage as an experiential spatial narrative. Second, natural language generation, character simulation, and knowledge graph allow AI-powered storytelling to make the narrator more interactive, more like a human person, addressing history, characters, and events like people do (Almeida, P., Teixeira, A., Velhinho, A., Raposo, R., Silva, T., & Pedro, L., 2024). Third, the interactive timeline enables the user to rearrange the narrative order by clicking, dragging and selecting to change history form as a linear presentation of events post-development to an interactive and exploratory structure. Lastly, algorithmic storytelling, via the analysis of user behavior, prediction of preferences, path recommendation, makes it possible to carry out real-time story scheduling to give differentiated narrative experiences to different users.

2.2 Emotional Mechanism

The immersive experience in digital heritage is not only driven by technological structures but is also profoundly influenced by emotional mechanisms. Affective Computing emphasizes the recognition, response, and feedback of technology to human emotions, achieving “emotionally sensitive” interactions through facial expression recognition, voice tone analysis, or user behavior pattern prediction (Yi, C., Huang, J., & Song, L., 2025). Meanwhile, Emotional Contagion theory points out that emotions can be imitated, infected, and spread in social interactions. In the context of digital heritage, the emotional presentation of narrative characters, emotional cues from background music, changes in light and shadow, etc., may evoke users’ emotional resonance through technological media.

The psychological foundation of immersive experiences can be understood from “Presence” to “Engagement.” The former emphasizes the perceptual illusion of “being there” that users generate in virtual environments, while the latter points to users’ emotional involvement in the content and construction of meaning. When technological narratives and emotional cues reinforce each other, users are more likely to shift from passive viewers to active participants.

At the same time, the role of emotions in activating cultural memory is particularly crucial. According to Assmann’s cultural memory theory, cultural memory is not a static storage but is reawakened and reinterpreted under emotional triggers. Digital heritage, through the combination of symbols, scenarios, and narrative emotions, enables users to form emotional connections with history in immersive experiences, thereby strengthening the recognition and reproduction of cultural significance.

2.3 Comprehensive Model of the Immersion Mechanism

The immersive experience of digital heritage is not determined by a single technology or narrative factor, but rather emerges from the dynamic interaction among "technology–narrative–emotion" (Ryan, M. L., 2015).

First, technological formatting (or formative shaping) refers to the foundational role of technology in structuring the experience: its algorithmic logic, interaction modes, and medium-specific characteristics provide the possibility boundaries and presentation framework for narrative. Technology is not a neutral tool; it is a structural force that determines how narrative situations are constituted and how content is generated.

Second, narrative structuring refers to how content is selected, arranged, and opened up to the user within the technological framework. Narrative here both depends on technology (e.g., AI generation, spatial storytelling, interactive paths) and, through plot construction, character development, and situational presentation, lays the foundation for emotional experience.

Finally, affective resonance is the key mechanism by which immersive experience comes into being. Within the technologically rendered environment, users undergo emotional responses triggered by the narrative, achieving deep engagement through the interplay of emotions, memories, and cultural meanings.

This model emphasizes that immersive experience is not an incidental effect brought about by technology, but rather the experiential outcome of "mutual resonance between narrative structure and affective mechanisms." Immersion is truly generated only when technology shapes the form of narrative, narrative activates emotional responses, and emotion in turn reinforces the user's sense of presence within the technological situation.

3. Pathways of Immersive Mechanism

Based on the previously proposed three-dimensional interactive model of "technology-narrative-emotion," this section will further analyzes the specific generation paths of immersive experiences in digital heritage from three dimensions: media convergence, experience structure, and emotional expression. Immersion is not caused by a single mechanism, but rather is a continuous process constituted by technological structure, narrative organization, and emotional triggering in a cross-media environment.

3.1 Media Convergence and Narrative Generation Cross-Media

The digital heritage transformation that is becoming engaged in communication is transforming the understandable display to the interactive generation of narrative. Cultural content can be transmitted through the combination of text, images, 3D models, sound effects, and interactive interfaces as the flow and recombination of cultural content across various media create a multimodal narrative ecosystem. The story is not told in this ecosystem in a linear manner, based on a set piece of text, but is facilitated together through technological logic of time, user routes of exploration, and media-media relationships. Technology is an acting narrative organizer. The functional approach defines the nature of how content is called, the interactive process impacts the timing on which the narrative nodes are activated and interface feedback modulates the rhythm of the narrative and the narrative is basically reliant on how the technological system functions. This may be taken as a case in point, the immersive digital exhibition of Sanxingdui, the system enables users to freely alternate between the general story and details on-site using techniques, including local 3D detail presentation, virtual light and shadow restoration, and semantic linking. The movement through perceptions, lingering or interactive actions on the part of the user may prompt the display of the cultural information at various levels and thus, the narrative becomes a co-agency of the technology and the user. Narrative generation does not entail anymore a fixed process of cultural communication, it is now a cultural experience re-combinable, protracted, and re-experienced in media convergence. Digital heritage therefore has real time, open, and changing path qualities where the cultural narration is not limited to the rigid text and transpires into the dynamic process that co-evolves with technology framework and with the contribution of the users.

3.2 Restructuring of Cross-Media Experience

Digital heritage expression has redefined the role of the audience in communication process and changed them to the conventional viewers to active experiences conveyors. With immersive technological spaces, the subject does not passively receive historical accounts but rather contributes to the creation of the narrative by adjusting the senses and traversing spatiality by movement and making interactive decisions. The experience structure is thereby changed to a unidirectional communication to a cyclical generation process between user and system. This reconstruction manifests itself at first in the alterations in perception. The multimodal interface, spatial sound effects, and the virtual scenes all engage visual, auditory and bodily senses hence creating a feeling of presence within the digital space hence facilitating further integration into the narrative process. At the same time, the actions of the user, such as changing the perspective, turning on the nodes of information, and deciding to go to other narrative layers make the content presentation directly dependent on the user and causes the narrative to become variable and real-time. This has been more pronounced in the VR mummy exhibition project at the British Museum (Wagner, K., 2017). The visual information is represented by 3D scans, virtual dissection and hierarchical presentation of the information whereby the user can independently choose the sequence by

which they want to explore the surface, the structure i.e., the outside wrapping texture and then the inside skeletal structure, or directly by leaping to the life history story (Wagner, K., 2017). With every shift in perception or interaction option, a new profuse range of information is pressed, resulting in the narrative developing and being the user as a part of it. This makes the process of communication an experiential event and not the passive experience with preset content.

3.3 Redefining Emotional Expression

Emotion has ceased to be a peripheral element to the content provided to people in the context of digital heritage, but a real instigator of experience creation. Technological logic (sound synchronization, delayed lighting and interface feedback) and emotional logic (sound resonance, anticipation and memory activation) integrate into each other to turn into a technologically discourse that is emotionally provoked by digital heritage.

Multi-sensory Immersive technology creates an experience that illuminates users with an emotional ambiance of the environment they are encountered with. As an example, certain virtual restoration projects implement ambient lighting effects or use of spatial sound effects in certain historical scenes, providing the user with a sense of navigation of a certain spatiotemporal environment and emotion as a point of entry to culture. At the same time, emotion is used to arouse cultural memory. The reproductive efforts of symbolic images and historical contexts, or the structuring of the narrative rhythms, provides the emotional relation between the user and communal cultural memory in way ensuring that not only informational meaning is involved in the experience but emotion of belonging to the culture as well. For example, in the Palace Museum's digital exhibition, when users scroll horizontally to watch A Thousand Li of Rivers and Mountains gradually unfurl across the screen—accompanied by elegant Northern Song court music—the sudden appearance of those iconic cyan-green mountains and rivers instantly overlaps with the familiar image from childhood textbooks. This visual impact, both alien and intimately recognizable, instantly triggers a deep emotional resonance of "This is the aesthetic of us Chinese people."

4. Discussion

The increase in swift evolution of the immersive digital heritage has offered the cultural heritage a new avenue in the propagation. A technology-narrative-emotion analytical framework is proposed in this study, which suggests that a dynamic interplay and ongoing negotiation between technological structure, narrative organization and emotional processes are the factors that have led to the creation of immersive experiences. Thus, heritage no longer means a pre-existing static piece of text to be read and interpreted but a piece that is created and redefined in real time in the interaction with the user. Nonetheless, there are also a number of risks that are associated with this process. First, immersive technology has a considerable impact on the narrative management of content creators and could result in a propensity to single and authoritative cultural interpretation, thereby contracting the spectrum of possible interpretations. Second, the high level of realism of the virtual restorations can add to the visual impact, and, rather, one may find oneself in a kind of hyperreality where the users pay more attention to the technological spectacle than to identifying the original context and aesthetics of the incompleteness of the heritage. Moreover, excessive dependence on the process of emotional triggering would simplify intricate historical recollection into temporary emotional highs without much thought and critical thinking.

More to the point, the user group cultural background, generational differences, and differences in individual experience have not been properly taken into consideration yet. The unified design of most projects under implementation continues to use a homogenous design, with no consideration of the deep differences among emotional response magnitude, memory activation criteria, and ethical acceptance among diverse cultural groups. This negligence can further contribute to the overall increase of the threat of cultural hegemony and decrease the inclusivity of immersive heritage practice. We can then actively construct multi-threaded, multi-path, user-choosable interpretations, and construct meaning not just once but many times on the exact same digital background, depending on the individual cultural setting.

5. Conclusion

This study proposes a "technology–narrative–emotion" analytical framework to explain the formation mechanism of immersive digital heritage experiences. The findings indicate that immersion does not stem from any single technological or narrative element, but emerges through the dynamic interplay among technical affordances, narrative structures, and users' emotional engagement. Cultural heritage, therefore, is transformed from a static, predefined text into a continuously negotiated meaning-making process enacted through real-time interaction. At the same time, the analysis reveals several risks embedded in current immersive heritage practices: technological enhancement may reinforce unilateral narrative authority; hyperreal visual restoration can overshadow the historical authenticity and material incompleteness of heritage; and excessive emotional stimulation risks reducing complex historical memories into momentary affective responses, thereby weakening

reflective and critical engagement.

Despite these insights, the study has several limitations. It primarily relies on theoretical and phenomenon-based analysis, without incorporating large-scale empirical data or comparative user studies. Moreover, the discussion underscores the insufficient consideration of cultural backgrounds, generational differences, and individual experiential variations in current design practices, yet this study itself does not provide detailed cross-cultural or demographic evidence. The framework therefore remains a conceptual model that requires further empirical validation. Future research should address these limitations by conducting user-centered and cross-cultural studies to examine how different communities negotiate meaning, emotion, and authenticity within immersive environments. It will also be valuable to explore multi-threaded or branching narrative structures, designing user-selectable interpretive pathways that can accommodate plural cultural perspectives rather than imposing a singular narrative logic.

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