



Interactive Experience Design Strategies for Digital Heritage Engagement: A Case Study of Stone Carvings in Southern Dynasties Mausoleums

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ABSTRACT

This study takes the stone carvings in Southern Dynasties mausoleums as a case study, focusing on interactive experience design strategies for digital heritage engagement. The study adopted qualitative research methods to identify barriers to user understanding and participation, and analyze their correlation with narrative structure, interactive logic, and interpretation methods. The findings indicate that although existing dissemination has increased visibility, there is a widespread experience gap of "high visibility but low intelligibility". The main manifestations are inadequate contextual information, lack of symbol interpretation, fragmented narrative, weak interaction mechanisms, and insufficient cross-platform linkage. Based on these findings, this study proposes an interactive experience design strategy framework, proposing collaborative optimization pathways from four dimensions: content organization, interaction mechanism, cross-media dissemination loop, and authenticity governance, providing transferable design references for the digital dissemination of stone carvings and dispersed heritage.

INTRODUCTION

With the rapid development of digital media and online platforms, the dissemination of cultural heritage is gradually shifting from on-site visits and static displays to cross-platform, multimodal digital dissemination practices (Jin & Liu, 2022). Digital technology not only improves the accuracy and dissemination of heritage information, but also enables heritage content to reach the public in a more accessible and interactive way (Tham et al., 2025; King et al., 2016). In this context, the dissemination of digital heritage gradually reveals clear design attributes: the dissemination effect often depends on the synergy of multiple factors, such as content selection, narrative organization, interface presentation, and interaction mechanisms (Lai et al., 2025). Especially in the current era where short videos, social media, and immersive experiences are continuously reshaping the structure of public attention, how to enhance public understanding and participation through interactive experience design has become an important issue in the research on the digital heritage dissemination.

However, digital dissemination does not equate to effective understanding. The significance of heritage is not simply presented, but constantly generated and reconstructed through media forms, information structures, and interactive pathways. For heritage types with complex historical contexts and symbolic systems, digital dissemination may not only expand public exposure, but also create understanding gaps due to insufficient interpretation and fragmented information, and even lead to misreading and value simplification (Liang et al., 2021). At the practical level, it is often tricky to naturally balance the evidence base relied upon by professional explanations, the accessibility required for public understanding, and the diffusion efficiency emphasized by platform dissemination (Manlee & Kasemsarn, 2025). It is necessary to adhere to authenticity and academic rigor, avoid excessive simplification caused by entertaining dissemination, and enhance dissemination effectiveness through more understandable and participatory experience design. Therefore, the dissemination of digital heritage should be seen as a comprehensive design process that balances content interpretation and experience mechanisms.

The stone carvings in Southern Dynasties mausoleums are an important component of the ancient Chinese mausoleum system, carrying the political order concept, religious beliefs, and aesthetic style of the Southern Dynasties period. They are a key material carrier for understanding the development of social culture and sculpture art in the Southern Dynasties. Unlike collections of cultural relics or centralized sites, the stone carvings in Southern Dynasties mausoleums are mainly distributed across Nanjing, Zhenjiang, and other areas, with characteristics of scattered locations, exposure to the elements, and limited on-site interpretation resources, limiting their public visibility and understanding. At the same time, this heritage type has strong symbolism in terms of spatial sequence and visual symbols. For example, the imagery of auspicious beasts, the order of spirit road, and metaphors of hierarchy often require historical context and symbolic knowledge to form a more complete understanding. Therefore, the stone carvings in the Southern Dynasties mausoleums have significant value in digital dissemination. It is not only suitable

for presenting high-definition details and visual explanations through digital media, but also more likely to encounter "visible but difficult to understand" experience barriers in fragmented dissemination, thus placing higher demands on interactive experience design.

Previous studies have explored how interactive media and storytelling facilitate users' understanding and engagement with heritage (Chong et al., 2021; Innocente et al., 2023; Dimoulas, 2022). However, these studies are mostly confined to museums or single environments, providing very limited guidance for dispersed outdoor stone inscriptions heritage. To fill this research gap, this study views interactive experience design as a means to reconstruct scenarios and interpretative pathways across platforms, facilitating users' understanding and sustained engagement.

Based on the above background, this study uses stone carvings in Southern Dynasties mausoleums as a case study, focusing on the design of interactive experiences for the dissemination of digital heritage. Given the above challenges, the aim is to answer the following core questions: What are the typical experience barriers that the public faces in understanding and participating in existing digital dissemination practices? What are the connections between these experience barriers and the narrative structure, interactive logic, and interpretive methods of digital media? Under the constraint of authenticity, what interactive experience design strategies should be adopted for the dissemination of digital heritage? Therefore, this article adopts a qualitative analysis research approach to review and synthesize the digital dissemination content related to the stone carvings in Southern Dynasties mausoleums, and identify key issues in content organization, interaction mechanisms, and dissemination pathways. Based on this, propose interactive experience design strategy suggestions for digital heritage dissemination, in order to provide reference and reusable design ideas for digital dissemination practices of stone carvings and dispersed heritage.

LITERATURE REVIEW

Research on Digital Heritage Dissemination

The research on digital heritage dissemination initially focused on digital records, virtual displays, and resource openness, emphasizing the role of digital technology in heritage preservation, information dissemination, and public education (Siliutina et al., 2024; Pouloupoulos & Wallace, 2022). With the development of online platforms and mobile media, the research focus has gradually shifted from "whether heritage is seen" to "whether the public is willing to stay, whether they can understand, and whether sustained participation is formed" (Wang & Meng, 2024; Lee, 2024). In this transformation process, the dissemination effect pays more attention to the quality of user experience in the dissemination process, including whether the content is easy to understand, whether the exploration path is smooth, whether the interaction is effective, and whether it can promote the public to establish more stable interests and recognition.

Meanwhile, the dissemination of digital heritage typically presents a combination of cross-platform and cross-media forms (Song et al., 2025). Short videos and social media are suitable for reaching and attracting traffic, but they

have low information density and short narrative time. Digital exhibitions, interactive web pages, and immersive experiences are better suited to deepening understanding, but the entry threshold is relatively high. As a result, an increasing number of studies tend to view the dissemination of digital heritage as an experience chain that progresses from shallow to deep. From attracting attention to guiding exploration, to forming understanding and revisiting. This perspective provides a foundation for discussing interactive experience design strategies in this article.

Interactive Experience Design and Heritage Dissemination

The role of interactive experience design in the dissemination of digital heritage is becoming increasingly prominent. On the one hand, research on user experience and interaction design emphasizes that users do not passively receive information, but rather form attention allocation and understanding construction in interface layout, interaction feedback, operation pathway, and information hierarchy (Yusong et al., 2025; Li et al., 2022). On the other hand, heritage dissemination scenes often have characteristics such as high knowledge density, complex historical information, and strong specialization of symbol systems. It is often difficult to meet the understanding needs of diverse audiences through static graphics or linear narratives alone (Lian & Xie, 2024; Li et al., 2023). In contrast, design methods such as interactive browsing, progressive information presentation, comparative observation, and situational guidance can enhance exploration motivation while lowering the threshold for understanding, gradually shifting users from "seeing heritage" to "understanding heritage" (Yu & Hu, 2025; Rahaman & Tan, 2011).

In recent years, common forms of interaction in the field of heritage dissemination include: scalable high-definition detail browsing, 3D model rotation and structural prompts, path organization based on timelines or maps, task-based exploration and guided Q&A, immersive narrative experiences, etc. (Rizvic et al., 2024; Innocente et al., 2023). These studies and practices collectively demonstrate that the value of interactive experience design lies in its ability to help users establish a sense of information structure and cognitive pathways, improve understanding efficiency and engagement depth. Therefore, how to transform heritage content into interactive experiences that are explorable, understandable, and sustainable has become a more design-oriented issue in the research of digital heritage dissemination strategies.

Cross-Media Dissemination and Experience Loop

In the context of highly diversified dissemination platforms, one of the key challenges in the dissemination of digital heritage is "experience fragmentation". In practice, heritage dissemination projects often exhibit two tendencies. One is the fragmentation of content dissemination, where users only receive scattered information through short videos or social media, making it difficult to form a systematic understanding (Huang, 2025; Kasemsarn & Nickpour, 2025). The second issue is the lack of guidance for in-depth content. Although digital exhibitions or resource libraries are abundant in information, the entrance is unclear and the pathway is too long, making it difficult for users to enter the stage

of deep understanding (Chong et al., 2021). Therefore, some studies have begun to emphasize the experience connection and closed-loop design of cross-media dissemination, that is, through clear guidance mechanisms, content layering strategies, and platform collaboration pathways, users can gradually enter deep exploration from light exposure, and form revisit and diffusion after interactive participation.

From a design perspective, closed-loop dissemination is the configuration of content organization, interaction pathways, and propagation nodes as a whole system (Dimoulas, 2022). For example, short content serves as an entry point and provides interest triggers; Interactive web pages and digital exhibitions provide explanatory functions and offer structured understanding; Immersive experience undertakes situational functions and provides emotional resonance; UGC and sharing mechanisms undertake diffusion functions, forming a participation loop. This type of research offers a feasible perspective for the dissemination of the "Interactive Experience Design Strategy" proposed in this article, which should focus on the functional division and connection design between media.

Research Gaps and the Focus of This Study

Although existing research has thoroughly discussed the interactive forms and platform strategies of digital heritage dissemination, there are still deficiencies in terms of heritage type adaptation. The study focuses mainly on cave temples, museum collections, or centralized sites, with relatively limited attention paid to the dissemination characteristics of "stone carvings and dispersed heritage". Stone carving heritage often relies on observation of details and comparison of forms, and its value understanding needs to be completed through symbol interpretation, spatial sequence sorting, and contextual information supplementation. Distributed heritage faces practical problems such as scattered locations, weak on-site interpretation resources, and insufficient public accessibility and visibility. Dissemination strategies should not only enhance the viewing experience, but also strengthen the understanding pathway and exploration motivation.

The stone carvings in the Southern Dynasties mausoleums are representative in this sense. Its content involves the sequence of spirit road space, the image of auspicious beasts, and the metaphor of ritual hierarchy, which has a high explanatory threshold. Due to the uneven distribution of points and dissemination of resources, the public often only has access to scattered images or symbolic fragments, making it difficult to form a structural understanding. Therefore, this article takes the stone carvings in Southern Dynasties mausoleums as a case study, focusing on interactive experience design strategies in the dissemination of digital heritage. The aim is to propose a referenceable and transferable experience design pathway through problem diagnosis and strategy induction, providing design-oriented strategy support for the digital dissemination practice of stone carvings and dispersed heritage.

METHODOLOGY

Research Design

This study adopts a qualitative research method to explore the interactive experience issues and design strategies in the dissemination of digital heritage. The case study reveals the manifestation of design issues in real dissemination contexts and connects observable interactive characteristics with interpretation results. The select of stone carvings in Southern Dynasties mausoleums as the research object is due to their being heritage sites scattered outdoors, which have a high threshold for interpretation. This threshold is shaped by spatial sequencing (spirit roads) and ritual-symbolic imagery, making them a typical case study of "high visibility but low understanding" in digital dissemination.

Data Sources and Sampling

Data were collected in 2025 from publicly available digital dissemination medias related to stone carvings in Southern Dynasties mausoleums, with a particular emphasis on two representative WeChat mini-program products that aggregate cross-media content and interactions. The "Southern Dynasties Stone Carvings Cloud Exhibition" mini-program comprises 38 analyzable content pages, while the "Shicheng Xiaoge Talks Nanjing" mini-program contains 36 analyzable content pages (Table 1). Inclusion criteria: content focuses on the stone carvings in Southern Dynasties mausoleums; content includes interpretation information, interactive elements, and guidance functions (such as navigation, zooming in on details, task prompts, etc.); content is freely accessible to the public.

Table 1. Data source inventory

Product	Channel	Content scope (examples)	Item count	Collection period	Key interaction & interpretation features
Southern Dynasties Stone Carvings Cloud Exhibition	WeChat mini-program	Thematic exhibition; site units; object-detail pages; 3D/animation	38 pages	2026	Knowledge graph; 3D micro-animations; high-precision 3D viewing + explanation
Shicheng Xiaoge Talks Nanjing	WeChat mini-program	History & culture; immersive experience entries; graph pages; digital creative/IP	36 pages	2026	VR panoramas + 3D models; AI knowledge graph; modular content; IP interaction

Source: Table by author, 2026

Thematic Analysis and Trustworthiness

The analysis follows an iterative thematic analysis process. Firstly, materials are recorded and coded to capture observable characteristics related to understanding and engagement, such as the presence of situational interpretation, symbolic interpretation, narrative structure, interactive convenience, and cross-platform linking. Secondly, open coding is used to cluster high-level themes representing typical experiential barriers. Finally, themes are refined through continuous comparison across content types and platforms, and mapped to three interpretative dimensions: narrative structure, interactive logic, and interpretative methods. To enhance transparency and reduce interpretative bias, coding guidelines are maintained throughout the analysis process.

RESEARCH RESULTS AND DISCUSSION

Typical Experience Barriers

The sorting of digital dissemination content related to the stone carvings in Southern Dynasties mausoleums shows that existing dissemination practices have achieved certain results in improving visibility, especially in terms of image display and basic science popularization, which can achieve rapid reach. However, from the experience of public understanding and continuous participation, there is a common problem of "visible but difficult to understand" in the dissemination of content. Users often see stone carvings and local details, but it is difficult to form a structural understanding, and their participation behavior mostly stays at browsing and shallow interaction (Figure 1).



Figure 1. Cloud Exhibition of Southern Dynasties Stone Carvings

Source: *Southern Dynasties Stone Carvings Cloud Exhibition Mini Program*, 2026

Figure 1 illustrates a typical "low-threshold browsing" interface pattern discovered through analysis. Users can engage in simple interactions (scrolling, zooming, and browsing images), but the guiding pathways provided by the page (sequential navigation, question prompts, or explanatory hotspots) are very limited. These paths help transform passive browsing into structured exploration.

Specifically, comprehension barriers first manifest as a lack of contextual information. The dissemination of content tends to emphasize visual presentation, but there is insufficient explanation of the mausoleum system, spatial sequence meaning, and historical ritual context in which it is located. This can easily lead to users gaining a superficial understanding of the object, but lacking the necessary background to comprehend its cultural connotations. Secondly, insufficient explanation of the symbol system is another prominent issue. The stone carvings in Southern Dynasties mausoleums have strong symbolism in terms of form and image, such as the protective meaning of auspicious beasts, the symbol of power and legitimacy, and the hierarchical metaphor pointed to by the divine order. Without clear explanations, the public may easily understand them as general "ancient animal sculptures" or "decorative patterns", making it difficult to establish value recognition (Figure 2).

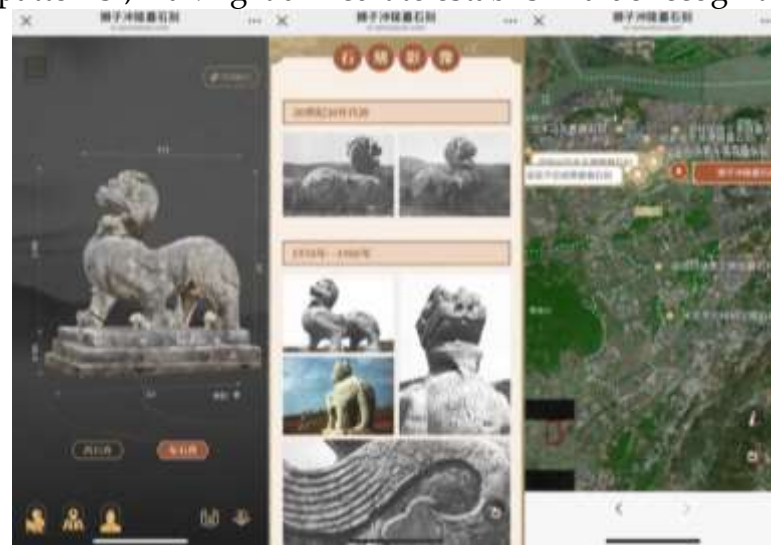


Figure 2. Cloud Exhibition of Southern Dynasties Stone Carvings

Source: *Southern Dynasties Stone Carvings Cloud Exhibition Mini Program*, 2026

Figure 2 illustrates that symbolic interpretations are often oversimplified or replaced by tourist "check-in" prompts, while explanations regarding the importance of stone carvings (ritual function, symbolic significance, hierarchical system, and cultural background) are either absent or incomplete.

In addition, experience barriers are also reflected at the level of interactive mechanisms. The dissemination content is mainly presented in a linear manner, with relatively limited interactive forms, and users lack guided exploration pathways, resulting in a walk after reading approach. Especially in the fast-paced media environment, the dissemination of content is more easily compressed into "spectacle style viewing" or "card-like knowledge points", lacking further exploration entrances and pathways, which affects the public's transition from shallow interests to deep understanding.

The Causes of Interactive Experience Issues

From the perspective of dissemination mechanisms, the above-mentioned experience barriers are interrelated with the narrative structure, interactive logic, and interpretation methods in digital media. Firstly, in terms of narrative

structure, existing dissemination content often takes a single object as the narrative unit, lacking an organizational approach that embeds it into spirit road sequences and historical contexts. Although this fragmented object narrative facilitates rapid dissemination, it is difficult to support the public in establishing a holistic understanding, resulting in scattered knowledge points and difficulty in connecting meanings (Figure 3).



Figure 3. Shicheng Xiaoge Talks Nanjing

Source: *Shicheng Xiaoge Talks Nanjing Mini Program*, 2026

Secondly, in terms of interactive logic, existing dissemination often lacks understanding-oriented interactive pathway design. The platform only provides weak interactions such as viewing, sliding, and resizing, with few interactive mechanisms for heritage learning and exploration (Figure 4). For example, detailed comparison, symbol explanation prompts, timeline and space line navigation, exploration tasks and feedback, etc. Insufficient interaction keeps the user experience stuck in the stage of receiving displays, lacking space for active exploration and meaning construction. For the stone carving heritage, this issue is particularly critical because its artistic value often depends on detailed line carving, differences in modeling styles, and spatial sequence logic. If the process of "observation, comparison, and explanation" cannot be supported at the interactive level, it will be challenging to improve the depth of public understanding.



Figure 4. Shicheng Xiaoge Talks Nanjing
Source: Shicheng Xiaoge Talks Nanjing Mini Program, 2026

Finally, in terms of interpretation methods, there is a polarized situation of "too little or too dense interpretation information" in existing dissemination (Figure 5). Part of the content weakens the explanation in pursuit of dissemination efficiency, retaining only minimalist tag-style knowledge points. The other part of the content directly uses more professional archaeological or art history discourse, which makes it difficult for the public to understand. In short, the lack of hierarchical and progressive design strategies in the explanation method makes it difficult to balance the cognitive foundation and understanding rhythm of different audiences in the dissemination process. This also explains why some dissemination, although rich in content, is difficult to transform into effective experiences.



Figure 5. Shicheng Xiaoge Talks Nanjing
Source: Shicheng Xiaoge Talks Nanjing Mini Program, 2026

Interactive Experience Design Strategy Framework

Based on the above results, this study further summarizes and proposes an interactive experience design strategy framework for digital heritage dissemination. This framework emphasizes the goal of "promoting understanding and sustained participation", and through the collaborative design of content organization, interaction mechanisms, and dissemination pathways, enhances dissemination quality and sustainability under authenticity constraints. Overall, the strategic framework can be summarized into four levels (Figure 6).



Figure 6. Interactive Experience Design Strategy Framework for Digital Heritage Dissemination

Source: Figure by author, 2026

Firstly, the content organization strategy. Explain layering and contextual completion. To address the issues of missing context and insufficient symbol interpretation, heritage content should be expanded from a single object to an information structure of "object, space, system, culture", and presented in a hierarchical manner. The basic layer provides the core information with the lowest understanding threshold (what it is, where it is, and what its characteristics are); Explains the meaning and spatial sequence of supplementary symbols in the interpretation layer (why they are placed in this way, what they symbolize); The extension layer provides professional materials and reference sources for deep users. Through hierarchical organization, accessibility is ensured while avoiding overly simplified explanations or high professional barriers.

Secondly, the interaction mechanism strategy. Experience guidance from viewing to exploration. The dissemination of digital heritage should guide users from passive browsing to active exploration, and strengthen the support function of interactive experience for understanding. Specifically, it includes: providing detailed magnification and local annotation (highlighting line engraving, weathering marks, and process features); Set up comparative interaction (comparing the symbolic meanings of different stone beast forms and styles, and comparing the symbolic meanings of different components); Introduce exploration paths (such as sequential interactions along the pathway of spirit road); Adopting a task mechanism (questioning guidance, selective explanation,

exploration completion feedback). These mechanisms can enhance dwell time and cognitive investment, enabling users to gradually establish structural understanding during the interaction process.

Thirdly, cross-media dissemination strategies. Build an experience loop of "drainage, deepening, and follow-up". To address the understanding gap caused by fragmented dissemination, a cross-platform dissemination chain should be established. Short videos and social media are responsible for "outreach and interest stimulation", leading to interactive web pages or digital exhibitions through clear entry points; The interactive platform undertakes the "structured explanation and exploration experience", providing content hierarchy and interaction mechanism; Immersive experience undertakes "situational understanding and emotional resonance". Meanwhile, a follow-up mechanism should be designed at the end of the experience, such as personalized content recommendations, collection and learning progress, theme card sharing, etc., to enable users to form sustained attention.

Fourthly, authenticity and interpretation of governance strategies. Establish a transparent and traceable interpretation mechanism. In the dissemination of digital heritage, authenticity is not only a matter of data accuracy, but also a matter of interpretation responsibility. To avoid the spread of misinterpretation caused by entertainment-oriented dissemination, a basic governance mechanism should be established in the dissemination content. Clearly distinguish between factual information, speculative explanations, and creative expressions; Provide evidence sources or reference basis for key explanations; Set prompts and disclaimers for symbol explanations that may cause misunderstandings. By transparently presenting the explanation basis and boundaries, it is possible to reduce the risk of value dilution while encouraging public participation, thereby enhancing the professional credibility and long-term sustainability of digital dissemination.

Design Inspiration

This study proposes an interactive experience design strategy using the stone carvings in Southern Dynasties mausoleums as a case study. Its significance lies not only in responding to the dissemination challenges of specific heritage objects, but also in providing transferable design inspiration for the digital dissemination of stone carvings and dispersed heritage. The characteristic of "detail-dependent understanding" is common in stone carving heritage, and the dissemination strategy should strengthen the observation of details, comparative understanding, and symbol interpretation; Distributed heritage sites generally face the problem of insufficient on-site explanations and uneven distribution of dissemination resources. Dissemination strategies should transform fragmented content into structured understanding pathways through cross-platform collaboration and experience closed loops.

Overall, the key to the dissemination of digital heritage lies in whether interactive experience design can prompt the public to shift from "seeing heritage" to "understanding heritage". When a collaborative mechanism is formed between content layering, interaction paths, and dissemination loops,

digital heritage dissemination can balance understanding depth and dissemination sustainability while improving accessibility. By using the stone carvings in Southern Dynasties mausoleums as a case study, this article provides a more design-oriented and implementable strategic framework for the dissemination of digital heritage, which is helpful for achieving application and adjustment in different heritage types and platform environments.

CONCLUSIONS AND RECOMMENDATIONS

This study takes the stone carvings in Southern Dynasties mausoleums as a case study, focusing on the design of interactive experiences for digital heritage dissemination. Research has found that although existing digital dissemination practices have increased the visibility of heritage, there are still experience barriers of "visible but difficult to understand" in terms of public understanding and sustained participation. The main manifestations are insufficient contextual information, lack of symbol interpretation, fragmented narrative, weak interaction mechanisms, and insufficient cross-platform linkage. Based on this, this article proposes an interactive experience design strategy framework for digital heritage dissemination, with the goal of "promoting understanding and sustained participation". A collaborative optimization pathway is proposed from three dimensions: content organization, interaction mechanism, and cross-media dissemination loop. Authenticity and interpretation governance mechanisms are used to ensure the credibility and sustainability of dissemination. This article provides transferable design strategy references for the digital dissemination of stone carvings and dispersed heritage. Future research can combine user testing and quantitative evaluation to further validate the effectiveness of the framework, and iteratively optimize it in different heritage types and platform environments.

This study is based on publicly available communication platforms, but no direct user testing or behavior analysis has been conducted, so the research conclusions still need further empirical testing. Future research can conduct user studies targeting different audience groups (such as age, education level, and cultural familiarity) to validate the effectiveness of the framework, and combine qualitative feedback with quantitative indicators (such as comprehension tests, task completion performance, and sustained engagement) to conduct mixed method evaluations.

ADVANCED RESEARCH

Future research should empirically validate the proposed interactive experience design framework through user testing involving diverse audience groups with varying ages, educational backgrounds, and levels of cultural familiarity. A mixed-methods approach combining qualitative feedback with quantitative measures, such as comprehension, task completion, sustained engagement, and user satisfaction, would provide a more comprehensive evaluation of the framework's effectiveness. In addition, future studies should examine the applicability of the framework across different types of cultural heritage and digital platforms to assess its scalability, adaptability, and long-term potential for enhancing digital heritage dissemination and public participation.

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