

Research on the Evaluation System for the Revitalization and Utilization of Historical Buildings from the Anti-Japanese War in Chongqing and the Dissemination Path of Digital Study Tours

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Abstract: Against the backdrop of ongoing urban renewal, the dissemination of red culture, and the advancement of smart cultural heritage, the preservation objectives for Chongqing’s anti-Japanese War historical buildings are shifting from “preventing disappearance” to “utilization within preservation and dissemination through utilization.” This paper, starting from the needs of revitalization and utilization, constructs a five-dimensional evaluation framework encompassing “conservation of the original structure, digital fidelity, narrative dissemination, educational transformation, and operational governance.” Furthermore, it proposes a digital study tours product system that connects “heritage sites, online exhibition halls, curriculum resources, research tasks, and urban routes.” By examining two digital model samples from Nanquan, namely Tingquan Building and Kong Garden, this paper discusses the differentiated transformation paths for single-dwelling and compound architectural types in digital study tours. The study posits that the revitalization and utilization of Chongqing’s anti-Japanese War historical buildings should not be equated with general tourism development. Instead, it should be based on authentic preservation, supported by digital archiving and narrative design, and guaranteed by curricular transformation and platform-based governance, thereby facilitating the transformation of historical buildings from static relics into public learning spaces, urban memory nodes, and continuous communication media.

Keywords: Anti-Japanese war historical buildings; Revitalization and utilization; Comprehensive evaluation; Digital study tours; Dissemination and transformation

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1. Introduction

Chongqing’s anti-Japanese War historical buildings serve not only as significant spatial carriers of urban

memory but also as crucial material evidence of the historical narratives of the Chinese People's War of Resistance Against Japanese Aggression and the World Anti-Fascist War. Against the backdrop of the growth of digital cultural consumption, accelerated urban renewal, and the normalization of research and learning practices, the preservation objectives for historical buildings are shifting from "preserving them" to "preserving them while ensuring public understanding and sustained use." From the national cultural digitalization strategy to museum reform and development policies, the construction of digital resources, public education, and the synergy between culture and tourism have become important topics in the protection and utilization of cultural heritage ^[1,2].

Compared to general historical buildings, Chongqing's anti-Japanese War historical buildings possess a higher narrative density and social educational attributes. The spaces behind them correspond to multiple historical contexts, including the political operations of the wartime capital, educational relocation, cultural salvation, social life, and urban air defense. Without effective exhibition translation and educational design, even the most intact buildings can easily be reduced to "old houses" or "check-in spots" in the eyes of the public. Therefore, the significance of digital technology in revitalization and utilization lies not only in "seeing the buildings more clearly" but also in helping the public reconstruct their understanding of history within these spaces.

Based on this, this paper focuses on two core questions: "How to evaluate the quality of revitalization and utilization?" and "How to transform digital resources into research and learning dissemination products?" On the one hand, it establishes operational and comparable comprehensive evaluation indicators; on the other hand, it links digital exhibition halls, AR guided tours, curriculum resources, generative AI explanations, and urban thematic routes to form a continuous chain from site exhibition to knowledge dissemination.

2. The practical basis and main issues in the revitalization and utilization of Chongqing's anti-Japanese war historical buildings

Chongqing has established a relatively solid foundation for displaying anti-Japanese War sites. The Chongqing Anti-Japanese War Sites Museum conducts public exhibitions and research and learning education based on the Huangshan Anti-Japanese War Site Cluster, while the Chongqing Anti-Japanese War Education Museum focuses on the wartime educational relocation and cultural salvation, highlighting Chongqing's historical role in hosting school relocations, the displacement of teachers and students, and cultural continuity during the war. This demonstrates that Chongqing's anti-Japanese War sites not only possess cultural relic value but have also entered the educational and cultural tourism public service system ^[3,4].

However, from the perspective of utilization forms, several common issues persist as follows:

- (1) The exhibition logic often remains at the level of "static viewing + guide narration," with digital achievements and the actual sites not yet deeply connected;
- (2) Much content is still primarily displayed at individual points, lacking thematic routes, timelines, and character networks that span multiple sites;
- (3) Learning-oriented designs for schools and young people are insufficient, with a lack of effective conversion mechanisms between the visiting experience and curriculum tasks;
- (4) The evaluation system is relatively weak, resulting in a lack of comparable bases for assessing issues such as "whether utilization is excessive," "whether dissemination is effective," and "what the educational outcomes are."

From an international perspective, world heritage and digital platforms are transitioning from display-

oriented websites to content asset platforms and public interaction platforms. UNESCO’s “Dive into Heritage” provides online access paths through 3D models and digital narratives, while the European Cultural Heritage Data Space Strategy further incorporates AI, 3D, XR, interoperability, and governance as future priorities [5-7]. This indicates that the revitalization and utilization of Chongqing’s anti-Japanese War historical buildings need to break away from the linear model of “one museum, one building, one visit” and move towards a platform-based organization with “multiple nodes, multiple terminals, and multiple scenarios.”

3. A five-dimensional evaluation framework for the revitalization and utilization of Chongqing’s anti-Japanese war historical buildings

To determine whether the revitalization and utilization of anti-Japanese War historical buildings are effective, simply observing the open rate, visitor numbers, or online dissemination is insufficient. Revitalization and utilization involve multiple aspects, including conservation of the original structure, digital archiving, public narration, educational transformation, and subsequent governance. Therefore, it is necessary to first break down the evaluation objects into several observable dimensions and then establish a comprehensive indicator system that balances cultural value, technical quality, and public benefits. Based on this approach, this paper summarizes the main evaluation dimensions and observation focuses in **Table 1**.

Table 1. Comprehensive evaluation index system for the revitalization and utilization of Chongqing’s anti-Japanese war historical buildings

Primary dimension	Example secondary indicators	Evaluation focus	Application notes
Ontological Protection	Authenticity, Integrity, Structural Safety, Appropriateness of Restoration	Determines whether the principle of protection priority is adhered to	Prevents excessive renovation and symbolic renewal
Digital Fidelity	Acquisition Accuracy, Semantic Completeness, Archival Association, Update Frequency	Determines whether digital outcomes are reliable	Avoids presentation results that are “visually appealing but unusable”
Narrative Communication	Historical Narrative, Spatial Guidance, Interactive Experience, Media Adaptability	Determines whether communication is effective	Emphasizes public understanding and clear information hierarchy
Educational Transformation	Curriculum Integration, Task Sheets, Learning Feedback, Cross-stage Adaptability	Determines whether educational products are formed	Strengthens the connection between field study and curriculum
Operational Governance	Copyright Management, Platform Maintenance, Collaborative Mechanisms, Public Participation	Determines whether operations are sustainable	Emphasizes institutional guarantees and long-term maintenance

Table 1 indicates that revitalization and utilization are not merely a matter of display but a complex system comprising conservation, technology, dissemination, education, and governance. Among these, conservation of the original structure serves as the foundational dimension, digital fidelity provides technological support, narrative dissemination and educational transformation constitute the output link aimed at the public, and operational governance determines whether digital outcomes can be sustained in the long term. These five dimensions can be evaluated separately and also serve as a common reference framework for subsequent project diagnosis and proposal comparison.

In addition to static indicators, it is necessary to clarify that the five dimensions are not simply juxtaposed but are interconnected in a way that they mutually constrain and promote each other. To this end,

this paper further transforms them into a five-dimensional interactive framework, as illustrated in **Figure 1**.

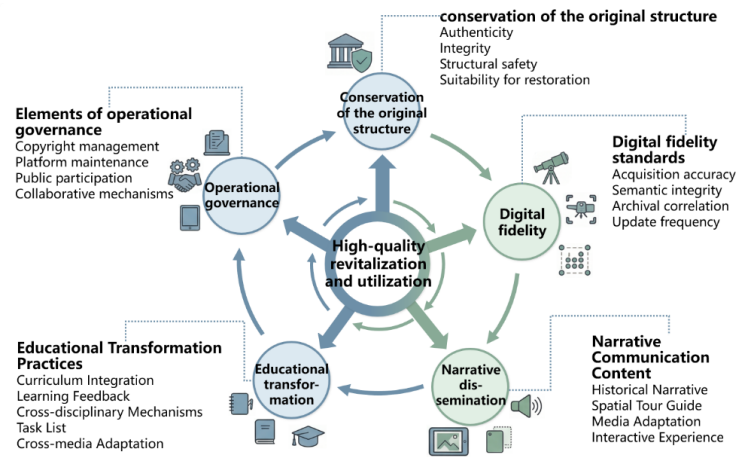


Figure 1. Five-dimensional evaluation framework diagram for the revitalization and utilization of historical buildings from the anti-Japanese war period in Chongqing.

Figure 1 illustrates that high-quality revitalization and utilization do not aim for a single dimension to lead independently but emphasize balance and synergy among all dimensions. If narrative communication is overly emphasized while neglecting ontological protection, historical information is prone to being trivialized or sensationalized. If digital modeling is prioritized without sufficient educational transformation, even the most detailed models may struggle to integrate into the public learning chain. Without operational governance, even the most mature platforms can quickly become obsolete. Therefore, the value of the five-dimensional framework lies in providing a unified evaluation logic for different types of buildings and projects at various stages.

4. System construction and scenario design of digital study tours products

If the evaluation framework answers the question of “what constitutes high-quality revitalization and utilization,” then the product system addresses the question of “how to transform historical building resources into content forms that are perceivable, learnable, and disseminable by the public.” From the perspective of digital study tours, products should not be limited to a single exhibition page or a one-time guided tour service but should form a continuous product chain ranging from the site location to online platforms and from course packages to urban routes. Based on this approach, this article summarizes the main product types as shown in **Table 2**.

Table 2. Matrix of digital study tours products for historical buildings from the anti-Japanese war period in Chongqing

Product type	Application scenario	Core technology	Target audience	Transformation goal	Product type
Web-Based Digital Exhibition Hall	Online Outreach	Panoramic Roaming, 3D Gaussian Splatting, WebXR	General Public	Building Panoramas, Timelines, and Hotspot Explanations	Web-Based Digital Exhibition Hall
On-Site AR Guided Tour	On-Site Visits	AR Recognition, Positioning and Navigation	Tourists, Primary and Secondary School Students	Component Interpretation, Historical Scene Overlay	On-Site AR Guided Tour

Micro-Learning Courses	School Teaching	Micro-Lecture Videos, Model Slices, Task Sheets	Primary/Secondary Schools and Universities	Formation of Replicable Course Packages	Micro-Learning Courses
Project-Based Course Resources	Professional Teaching	HBIM, GIS, Case Database	Design Students	Support for Surveying, Modeling, and Updating Training	Project-Based Course Resources
City-Themed Itineraries	Cultural Tourism Integration	Map Navigation, Narrative Routes	Tourists, Study Tour Groups	Achieving Multi-Site Integrated Dissemination	City-Themed Itineraries

As can be seen from **Table 2**, different product forms correspond to distinct usage scenarios and dissemination objectives. Web-based digital exhibition halls are suitable for undertaking popular exhibition tasks, on-site AR guided tours are ideal for enhancing the experience of heritage sites, micro-courses and project-based resources are more suited for integration into school teaching systems, while urban thematic routes reposition individual buildings within a broader urban memory network. These elements do not replace one another but should form a combination following the logic of “display–learning–feedback–re-dissemination” [8].

To further illustrate the interconnections among various products, this paper organizes digital study tours products into a closed loop of “heritage site–online exhibition hall–curriculum tasks–learning feedback–dissemination and transformation,” as shown in **Figure 2**.

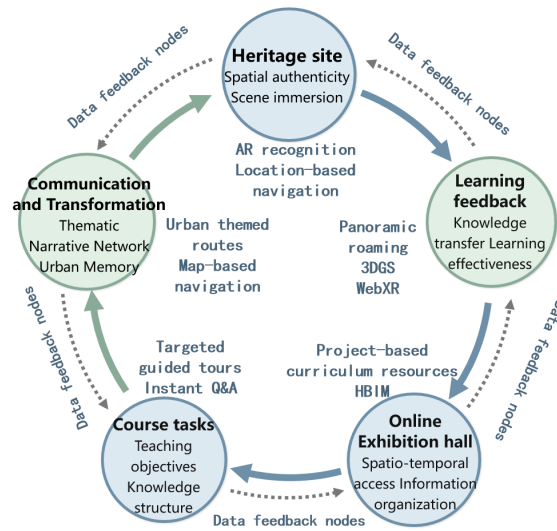


Figure 2. Closed-loop diagram of digital study tours products.

Figure 2 illustrates that Digital study tours does not simply flow unidirectionally from on-site visits to online displays; rather, it constitutes a dynamic system capable of data feedback and continuous content optimization. The heritage site emphasizes spatial authenticity and immersive scenarios, while the online exhibition hall facilitates cross-temporal access and information organization. Curriculum tasks and learning feedback transform the viewing experience into knowledge transfer, ultimately achieving broader social dissemination through urban routes, audience-specific guided tours, and thematic communications. The crux of Digital study tours lies not in merely transferring content but in reorganizing information and learning flows.

5. Case study: The digital study tours transformation path of the Nanquan sample

5.1. Case type identification and transformation logic

This paper selects Tingquan Building and Kong Garden as the Nanquan sample, not solely because digital models of them already exist, but more importantly, because they represent two typical types: single-dwelling and compound architectural forms. The former is suitable for organizing a continuous experience around entrance, courtyard, and indoor nodes, while the latter is more apt for generating a compound learning scenario with multiple nodes and interconnected tasks. Examining both in tandem facilitates observation of the corresponding relationships between architectural types, narrative intensity, and research and learning organization methods.

Based on the aforementioned type differences, this paper summarizes the Digital study tours transformation path for the Nanquan sample into four stages: “resource identification–digital expression–research and learning tasks–dissemination and transformation.” The significance of **Figure 3** lies not in listing case names but in demonstrating that, although they all belong to anti-Japanese War historical buildings, different samples do not render themselves to a one-size-fits-all template in terms of spatial characteristics, expression methods, and dissemination channels.

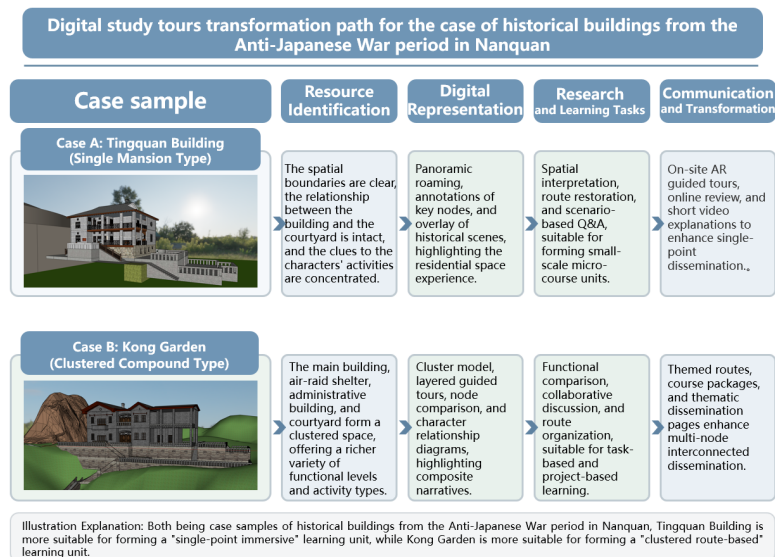


Figure 3. Digital study tours transformation path diagram for the anti-Japanese war historical buildings in Nanquan.

5.2. Differentiated transformation paths for typical samples

5.2.1. Tingquan Building: From single-point display to situational learning units

Tingquan Building features relatively intact spatial boundaries, with clear relationships between the building, courtyard, entrance, and main indoor spaces, making it suitable for organizing a continuous experience of “entering–staying–observing–narrating.” For such single-dwelling architectural types, activation and utilization that merely stop at exterior viewing or historical site check-ins are clearly insufficient to unleash their educational potential. A more viable path involves connecting spatial experiences with character activities, wartime life, and place memories through panoramic tours, key node annotations, and historical scene overlays. In designing research and learning products, Tingquan Building is better suited for constructing small-scale, immersive learning units. Tasks such as “spatial interpretation–route restoration–

situational Q&A” can be set around the entrance, main indoor spaces, and courtyard nodes, allowing learners to actively establish connections between spatial evidence and historical narratives, transforming the visit into a discussable and repeatable knowledge chain.

5.2.2. Kong Garden: From grouped spaces to route-based narrative units

Compared to Tingquan Building, Kong Garden exhibits more characteristics of a grouped compound. The main building, ancillary spaces, and courtyard together form a multi-layered activity scene, so its activation and utilization should not only emphasize a single room or interface but also focus on the functional relationships, route organization, and node hierarchy within the architectural group, further transforming the spatial structure into a learning structure.

In terms of digital expression and research and learning design, Kong Garden is better suited for adopting grouped models, layered guided tours, node comparisons, and character relationship diagrams, combined with tasks such as “functional comparison–collaborative discussion–route organization” to guide learners in understanding the roles of different nodes in the overall narrative. Compared to single-dwelling samples, Kong Garden is also more suitable as a key node in urban thematic routes, forming a linkage with surrounding anti-Japanese War buildings.

Overall, single-dwelling samples are better suited for micro-course-based, immersive dissemination, while grouped compound samples are more suitable for route-based, project-oriented organization. Truly effective transformation does not lie in template-based replication but in making targeted expression choices based on architectural type, narrative intensity, and audience needs. This is also an important prerequisite for the Nanquan sample to transition from case analysis to methodological summarization.

Furthermore, the key to digital study tours transformation does not lie in “whether digital models are available” but in whether expression media, task design, and dissemination channels can be matched according to architectural type, narrative intensity, and learning objectives. Only by embedding digital achievements into curricula, routes, and public education scenarios can models be transformed from display materials into sustainably updated knowledge resources.

6. Suggestions for promoting high-quality activation and utilization of Chongqing’s anti-Japanese war historical buildings

For the subsequent activation and utilization of Chongqing’s anti-Japanese War historical buildings, efforts should continue in at least the following aspects:

- (1) Prioritize protection and utilize moderately; for buildings with high historical value and fragile structures, digital displays should be prioritized to alleviate open pressure;
- (2) Establish a unified data foundation and metadata standards to enable cultural heritage institutions, universities, and cultural tourism management departments to share surveying and mapping results, historical archives, explanation scripts, and curriculum resources under the same rules;
- (3) Promote curriculum-based transformation by embedding digital achievements into ideological and political education, aesthetic education, history, architecture, and environmental design courses;
- (4) Reasonably introduce AI-guided tours, large-model Q&A, and audience-specific push notification mechanisms while ensuring historical accuracy through manual verification;

- (5) Improve copyright and platform governance mechanisms by planning authorization, usage, and update rules simultaneously at the project initiation stage;
- (6) Establish a regular maintenance and evaluation mechanism, incorporating visit volume, learning feedback, platform stability, data update frequency, and public satisfaction into annual monitoring.

7. Conclusion

The high-quality activation and utilization of Chongqing's anti-Japanese War historical buildings, in essence, is not about transforming heritage sites into more lively tourist attractions but about promoting their transition from static preservation objects to active nodes in social knowledge production. The key does not lie in simply increasing visitor numbers but in establishing a sustainable balance between historical authenticity, spatial experience, educational objectives, and digital governance, enabling preservation achievements to enter the processes of public understanding, continuous learning, and urban memory construction. The five-dimensional evaluation framework and digital study tours product system proposed in this paper provide a path for achieving this goal. With the continuous evolution of digital platforms, AI-guided tours, and three-dimensional dissemination technologies, Chongqing's anti-Japanese War historical buildings have the potential to evolve from scattered individual attractions and case achievements into a regionally interconnected digital network of red culture. In the future, what deserves more attention is not just whether individual projects are "spectacular" but whether existing experiences can be distilled into replicable standards, platforms, and collaborative mechanisms, forming stable models in audience-specific explanations, curriculum applications, cross-site linkages, and long-term operations. This way, different types of anti-Japanese War historical buildings can continuously release their cultural, educational, and urban memory values.

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