

From regional symbols to educational spaces: Spatial design pathways for Zuojiang Huashan rock art heritage

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Accepted 5 May, 2026

ABSTRACT

The Zuojiang Huashan Rock Art Cultural Landscape is a World Cultural Heritage property in Guangxi, China, and an important material witness to Luoyue cultural memory. Although previous studies have examined its historical value, ethnic cultural meanings, symbolic semantics, artistic inheritance, tourism use, and study-tour potential, fewer studies have explained how its regional symbols can be systematically transformed into cultural heritage education resources through spatial design. In response to this gap, this study adopts a qualitative, literature-based research design that combines literature analysis, cultural interpretation, and symbolic semantic analysis. A total of 24 sources were retained for close reading after database retrieval, screening, and thematic classification. The analysis focused on four coding dimensions: heritage value, symbolic meaning, educational function, and spatial design translation. The findings show that the regional symbols of Zuojiang Huashan rock art support historical cognition, aesthetic education, cultural identity formation, and interdisciplinary learning. However, the current communication and educational use of these symbols remains constrained by limited public awareness, shallow symbolic translation, insufficient educational scenario construction, and a lack of experiential design innovation. To address these problems, the paper proposes a spatial design framework consisting of four interrelated pathways: symbol extraction and narrative translation, construction of layered educational spaces, immersive participatory experience, and coordinated integration of protection, communication, and activation. Unlike general exhibition or tourism-oriented approaches, this framework emphasizes the transformation of rock art motifs from static visual images into interpretable, experienceable, and communicable learning resources. The study, therefore, contributes to heritage education research by linking symbolic interpretation, spatial narrative, and public learning within the context of Luoyue cultural transmission.

Keywords: Zuojiang Huashan rock art; spatial design; cultural heritage education; Luoyue culture; symbolic interpretation; heritage revitalization.

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INTRODUCTION

Research background

The Zuojiang Huashan Rock Art Cultural Landscape is one of the most representative rock art heritage sites in China and an important material carrier of Luoyue cultural memory. According to the UNESCO World Heritage Centre (n.d.), the property consists of 38 rock art sites located on steep cliffs in the karst, riverine, and tableland landscape of southwest China. The rock art dates from

approximately the 5th century BCE to the 2nd century CE and depicts the life and ritual activities of the Luoyue people. These characteristics make the site not only an archaeological and artistic resource, but also a cultural landscape through which regional history, ritual belief, and social memory can be communicated.

The heritage significance of Zuojiang Huashan is closely connected with its World Heritage inscription. The site was inscribed in 2016 under cultural criteria (iii) and (vi), rather

than under the full set of general World Heritage criteria. Criterion (iii) recognizes the property as an exceptional testimony to the spiritual and social life of the Luoyue people, while criterion (vi) emphasizes its direct association with bronze drum culture and related ritual

traditions (UNESCO World Heritage Centre, n.d.). This more precise inscription basis is important for the present study because it shows that the educational value of the site is grounded in cultural testimony, ritual symbolism, and the continuing interpretation of regional memory.

Table 1. World Heritage inscription basis of Zuojiang Huashan Rock Art Cultural Landscape.

Inscription aspect	Specific information for Zuojiang Huashan	Relevance to this study
Date of inscription	2016	Confirms the site as a recognized World Cultural Heritage property.
Criterion (iii)	The property vividly conveys the spiritual and social life of the Luoyue people and is the only witness to this tradition.	Supports the educational focus on cultural testimony, historical cognition, and regional memory.
Criterion (vi)	The images of drums and related elements are symbolic records directly associated with bronze drum culture.	Supports the interpretation of motifs as ritual and symbolic educational resources.
Cultural landscape basis	The property combines cliff paintings, karst landforms, rivers, and tablelands.	Supports a spatial design approach that connects symbols, landscape, and public learning.

Table 1 clarifies the specific World Heritage basis of Zuojiang Huashan Rock Art Cultural Landscape. Unlike a general list of inscription criteria, it focuses only on the criteria actually applied to this property. This revision strengthens the connection between the UNESCO heritage status and the educational interpretation developed in this study.

Existing studies have addressed the Zuojiang Huashan rock art from several perspectives. Some research emphasizes the site as evidence of ancient social life, ritual activities, and rock art traditions (Bednarik, 2021; Clottes, 2008; Gao, 2017). Other studies examine its symbolic language and multimodal metaphorical structure, especially the cultural meanings of human figures, bronze drums, boats, animals, and ritual scenes (Li and Chu, 2024; Zhang, 2025). A further group of studies discusses heritage interpretation, museum learning, and public education as ways of making cultural heritage more accessible to non-specialist audiences (Falk, 2009; Hein, 1998; Hooper-Greenhill, 2007; Hohenstein and Moussouri, 2018; McColl et al., 2025). These studies provide a foundation for interpreting the rock art as both cultural evidence and an educational resource.

Research problem and gap

Despite this foundation, the current scholarship still leaves an important gap. Research on Zuojiang Huashan has often focused on historical value, symbolic interpretation,

cultural tourism, or visual reuse, but has paid less attention to the specific process through which regional symbols can be transformed into structured learning experiences through spatial design. As a result, symbolic meanings are sometimes discussed at the level of cultural description, while the educational mechanisms of spatial organization, public participation, and reflective learning remain insufficiently developed.

This gap has practical implications. In heritage sites and related cultural spaces, public engagement with rock art is often limited to sightseeing, brief explanation, or visual appreciation. Such forms of contact can improve awareness, but they do not necessarily produce a deeper understanding of the ritual, historical, and symbolic meanings embedded in the heritage. Museum and heritage education research has long argued that learning is shaped by interpretation, identity, social context, and visitor participation (Falk, 2009; Hein, 1998; Hooper-Greenhill, 1999, 2007). Therefore, the educational transformation of Zuojiang Huashan requires more than the reproduction of motifs; it requires a design framework that connects symbols, narratives, spaces, activities, and cultural values.

The present study responds to this problem by shifting the focus from symbolic description to educational spatial transformation. It examines how rock art motifs can be selected, interpreted, organized, and communicated in spatial environments so that they become accessible resources for cultural heritage education. This approach also responds to the need to balance conservation,

dissemination, tourism activation, and local cultural sustainability within a coherent educational framework (Harrison, 2013; Smith, 2006; UNESCO World Heritage Centre, 2021).

Research questions

Based on the above problem, this study addresses three research questions:

- What kinds of cultural heritage education value are embodied in the regional symbols of the Zuojiang Huashan rock art?
- What limitations currently exist in the communication and educational use of these symbols?
- How can spatial design contribute to the transformation of rock art symbols into interpretable, experienceable, and communicable educational resources?

These questions correspond directly to the research design. The first question is addressed through literature analysis and cultural interpretation. The second question is examined through thematic synthesis of existing studies on heritage communication, museum learning, and rock art interpretation. The third question is developed through symbolic semantic analysis and design-oriented framework construction.

METHODOLOGY

Research design

This study adopts a qualitative, literature-based, and interpretive research design. It does not claim to test causal relationships or measure visitor learning outcomes statistically. Instead, it aims to clarify the educational value of Zuojiang Huashan rock art symbols, identify problems in their current communication, and construct a spatial design framework grounded in documented scholarship. This design is appropriate because the research problem concerns cultural meaning, symbolic translation, and educational interpretation rather than experimental intervention.

To improve methodological transparency and replicability, the research procedure was organized into four stages: literature retrieval and screening, thematic classification, symbolic semantic coding, and design framework synthesis. The method, therefore, moves from source selection to interpretation and then to the construction of spatial design pathways.

Literature retrieval and source selection

The literature corpus was built from academic and official

sources related to Zuojiang Huashan rock art, rock art interpretation, cultural heritage education, museum learning, exhibition design, heritage tourism, and World Heritage conservation. Sources were retrieved from UNESCO World Heritage Centre documents, Web of Science, Scopus, Google Scholar, CNKI, and Wanfang. The main English keywords included "Zuojiang Huashan rock art", "Huashan rock art", "Luoyue culture", "rock art symbolism", "cultural heritage education", "museum learning", "heritage interpretation", "exhibition design", and "spatial narrative". Chinese keyword equivalents, including "左江花山岩画", "骆越文化", "岩画符号", "文化遗产教育", and "空间设计", were also used to identify relevant Chinese-language scholarship.

The inclusion criteria were as follows: (1) sources directly discussing Zuojiang Huashan, Luoyue culture, rock art, cultural heritage education, museum learning, heritage interpretation, exhibition design, or heritage tourism; (2) peer-reviewed articles, academic books, edited research handbooks, or official UNESCO documents; and (3) sources that could contribute to at least one of the four analytical categories: heritage value, symbolic meaning, educational function, or spatial design translation. The exclusion criteria were: (1) news reports, travel advertisements, and non-academic web pages without research value; (2) sources that mentioned rock art only in passing; (3) duplicate or near-duplicate references; and (4) materials without a clear connection to the research questions.

An initial pool of 68 items was identified. After duplicate removal and title/abstract screening, 34 items were retained for preliminary review. After close reading and relevance assessment, 24 sources were retained as the final close-reading corpus. These 24 sources are the works cited in the reference list. Table 2 summarizes the screening logic and source categories.

Coding and analytical procedure

The retained sources were analyzed through a coding procedure. First, information about the heritage status, historical background, and inscription basis of Zuojiang Huashan was extracted from UNESCO documents and related rock art studies. Second, representative symbols and motifs, including the frontal human figure, sun, bronze drum or sheep-horn bell, bird, dog, and boat, were identified from studies on symbolic semantics and cultural interpretation. Third, educational functions were coded according to four categories derived from heritage education and museum learning research: historical cognition, aesthetic education, cultural identity formation, and interdisciplinary learning. Fourth, spatial design implications were coded according to narrative translation, layered space construction, participatory experience, and

protection-communication-activation integration.

The analysis followed a triangulation principle. A symbolic interpretation was retained only when it was supported by previous scholarship, consistent with the UNESCO description of the property, or explainable within the broader literature on Luoyue culture, ritual scenes, and

heritage interpretation. Where a meaning was inferential rather than directly verified, it was presented as an educational interpretation instead of an absolute historical conclusion. This procedure was used to avoid treating contemporary design meanings as if they were identical to original ritual meanings.

Table 2. Literature screening and source-selection procedure.

Stage	Procedure	Result
Initial retrieval	UNESCO documents and academic databases were searched using English and Chinese keywords related to Zuojiang Huashan, Luoyue culture, rock art symbolism, cultural heritage education, museum learning, exhibition design, and spatial narrative.	68 items identified
Preliminary screening	Duplicates, news reports, travel advertisements, and sources with only indirect relevance were removed.	34 items retained
Close reading	Sources were assessed according to relevance to heritage value, symbolic meaning, educational function, and spatial design translation.	24 sources retained
Final corpus	The retained sources included official UNESCO documents, rock art studies, heritage education studies, museum learning literature, exhibition design works, and cultural tourism studies.	24 works cited in the reference list

Table 3. Coding framework for literature-based symbolic and educational analysis.

Coding dimension	Analytical focus	Representative literature basis
Heritage value	World Heritage status, authenticity, integrity, Luoyue cultural testimony, bronze drum culture, and cultural landscape setting	UNESCO World Heritage Centre (n.d., 2021); Gao (2017); Meskell (2013)
Symbolic meaning	Meanings of human figures, sun, bronze drum, bird, dog, boat, ritual scenes, and regional cultural memory	Zhang (2025); Li and Chu (2024); Bednarik (2021); Clottes (2008)
Educational function	Historical cognition, aesthetic education, identity formation, interdisciplinary learning, visitor meaning-making	Falk (2009); Hein (1998); Hooper-Greenhill (1999, 2007); Hohenstein and Moussouri (2018); McColl et al. (2025)
Spatial design translation	Narrative sequencing, exhibition design, interpretation, immersive participation, digital interaction, and heritage activation	Dernie (2006); Macdonald (2007); Ham (2013); Uzzell (1989); Charitonos et al. (2012); Pine and Gilmore (2011)

Scope and limitations of the method

Because this study is based on literature and interpretive synthesis, it does not include field observation, interviews, visitor surveys, or experimental testing of spatial design outcomes. Therefore, the proposed framework should be

understood as a conceptual and design-oriented model rather than an empirically validated intervention. Nevertheless, the method provides a clearer and more replicable basis than a purely conceptual essay because it specifies the retrieval sources, selection criteria, corpus size, coding dimensions, and validation logic used in the analysis.

RESULTS

Educational value of the regional symbols of Zuojiang Huashan rock art

The analysis indicates that the regional symbols of Zuojiang Huashan rock art possess four main forms of cultural heritage education value: historical cognition, aesthetic education, cultural identity formation, and interdisciplinary learning. These values are not separate from the heritage status of the site. Rather, they arise from the combined relationship among cliff paintings, karst and river landscapes, Luoyue ritual culture, bronze drum symbolism, and contemporary interpretation.

First, the rock art supports historical cognition. UNESCO describes the 38 sites as illustrating the life and rituals of the Luoyue people between approximately the 5th century BCE and the 2nd century CE, and as the only remaining witness to this cultural tradition (UNESCO World Heritage Centre, n.d.). This makes the site a concrete educational medium through which learners can approach ancient social organization, ritual activity, and regional historical memory. Rock art interpretation studies also show that visual remains can function as cultural evidence when they are carefully contextualized rather than treated as isolated images (Bednarik, 2021; Clottes, 2008; Gao, 2017).

Second, the rock art has value for aesthetic education. The motifs are visually distinctive because of their simplified silhouettes, frontal postures, rhythmic arrangement, symbolic density, and strong contrast with the cliff surface. These features make the site relevant not only to archaeology and history but also to art education, visual culture education, and design learning. Studies of rock art and Huashan symbolic expression suggest that the motifs combine visual form with ritual and social meanings, which enables learners to connect aesthetic observation with cultural interpretation (Li and Chu, 2024; Zhang, 2025).

Third, the rock art contributes to cultural identity formation. Heritage studies emphasize that cultural heritage is not merely a collection of old objects, but a process through which communities negotiate memory, identity, and value (Harrison, 2013; Smith, 2006). In the case of Zuojiang Huashan, the symbols connect local Luoyue memory with the wider history of ethnic interaction in southern China. Educational interpretation can therefore help visitors understand the continuity between regional tradition, local belonging, and national cultural diversity.

Fourth, the rock art supports interdisciplinary learning. Its interpretation involves history, archaeology, ethnology, art, design, geography, tourism, ritual studies, and education. Museum and heritage education literature shows that cultural objects can generate rich learning when learners are encouraged to connect visual evidence, social context, personal experience, and disciplinary knowledge (Hein, 1998; Hooper-Greenhill, 2007;

Hohenstein and Moussouri, 2018; McColl et al., 2025). Zuojiang Huashan is therefore suitable for place-based education, public learning programs, study-tour activities, and interdisciplinary cultural design courses.

Problems in current communication and educational use

The analysis also identifies four limitations in the current communication and educational use of Zuojiang Huashan rock art symbols. These limitations do not mean that the heritage lacks public value. Rather, they indicate that its educational potential has not yet been fully transformed into structured learning experiences.

The first problem is limited public awareness and insufficient interpretive depth. Visitors may recognize the site as a famous heritage destination, but still lack a clear understanding of why the motifs matter historically and culturally. Heritage interpretation theory emphasizes that effective interpretation must connect factual information with meanings that audiences can understand and remember (Ham, 2013; Uzzell, 1989). If interpretation remains at the level of brief explanation, the connection between symbol, ritual, and cultural memory may remain weak.

The second problem is superficial symbolic translation. Some contemporary uses of rock art motifs reproduce them as decorative patterns or visual branding elements. This may increase visibility, but it can also detach the motif from its cultural context. Exhibition design research suggests that the educational value of visual display depends on narrative organization, spatial sequencing, and interpretive support, rather than on graphic repetition alone (Dernie, 2006; Macdonald, 2007). Therefore, the reuse of Huashan motifs should be accompanied by an explanation of their cultural and ritual meanings.

The third problem is insufficient integration of educational scenarios. Many heritage experiences still follow a viewing-based model in which visitors observe a site or display but have limited opportunities to question, compare, discuss, create, or reflect. Museum learning research shows that visitor learning is shaped by prior knowledge, identity, social interaction, and activity design (Falk, 2009; Hein, 1998; Hooper-Greenhill, 1999). For Zuojiang Huashan, educational scenarios should therefore include guided inquiry, symbol interpretation tasks, comparative image reading, design workshops, and reflective activities.

The fourth problem is limited innovation in participatory and digital experiences. Contemporary heritage education increasingly uses digital media, mobile technologies, and social interaction to expand visitor engagement (Charitonos et al., 2012). However, the educational use of Zuojiang Huashan still has room to develop multisensory interpretation, age-specific programs, and immersive

design that connects symbolic meaning with embodied learning. Without such innovation, the heritage may remain visible but not fully intelligible.

Spatial design pathways for cultural heritage education

Based on the above findings, this study proposes a spatial design framework for transforming the regional symbols of Zuojiang Huashan rock art into cultural heritage education resources. The framework consists of four interrelated pathways: symbol extraction and narrative translation, construction of layered educational spaces, immersive participatory experience, and coordinated integration of protection, communication, and activation.

Symbol extraction and narrative translation

The first pathway is symbol extraction and narrative translation. Representative motifs should not be extracted only for decoration; they should be translated into educational narratives that explain cultural meanings, ritual associations, and contemporary relevance. In this process, design should distinguish between original symbolic meanings and contemporary educational adaptations. Original meanings refer to historically and culturally grounded interpretations supported by the literature, while contemporary adaptations refer to carefully developed learning meanings that help present-day audiences connect the symbols with themes such as protection, harvest, power, continuity, and cultural identity.

Table 4. Symbolic meanings, educational adaptations, and source support for representative motifs.

Motif	Original symbolic meaning	Contemporary educational adaptation	Source support
Frontal human figure in a frog-like posture	Associated with ritual posture, fertility consciousness, collective ceremony, and prayers for continuity and prosperity.	Used to teach bodily expression, ritual life, social memory, and the relationship between form and belief.	Zhang (2025); Li and Chu (2024); UNESCO World Heritage Centre (n.d.)
Sun	Associated with power, vitality, agricultural hope, and cosmological order.	Used to explain environmental perception, seasonal rhythm, leadership symbolism, and visual abstraction.	Zhang (2025); Li and Chu (2024)
Bronze drum / sheep-horn bell	Associated with chieftainship, ritual sound, authority, protection, and bronze drum culture.	Used to connect visual motifs with ritual performance, social organization, and regional cultural identity.	UNESCO World Heritage Centre (n.d.); Zhang (2025); Gao (2017)
Bird	Associated with protection, movement, spiritual imagination, and auspicious meaning.	Used to discuss guardianship, mobility, and symbolic transformation in visual culture.	Zhang (2025); Bednarik (2021)
Dog	Associated with hunting, protection, companionship, and ritualized livelihood.	Used to connect heritage interpretation with daily life, safety, and human-animal relations.	Zhang (2025); Gao (2017)
Boat	Associated with rivers, water rituals, transportation, harvest, and communication across the landscape.	Used to explain riverine culture, ecological environment, local livelihood, and landscape-based heritage learning.	UNESCO World Heritage Centre (n.d.); Zhang (2025); Li and Chu (2024)

Table 4 shows that the symbolic system of Zuojiang Huashan can be transformed into spatial narratives without reducing the heritage to decorative imagery. For example, the bronze drum motif can be placed in a ritual

and social-order narrative, while the boat motif can be connected with riverine life, water rituals, and local ecological knowledge. This narrative translation enables visitors to move from visual recognition to cultural understanding.

Construction of layered educational spaces

The second pathway is the construction of layered educational spaces. A heritage education space should not present all information at once. Instead, it should guide visitors through progressive learning stages. The first layer can be an orientation space that introduces the geographical setting, historical period, World Heritage status, and Luoyue cultural background. The second layer can be a symbol interpretation space that explains motifs, ritual scenes, and semantic relationships. The third layer can be an interactive learning space where visitors engage with motifs through digital media, hands-on design, comparison tasks, or guided discussion. The fourth layer can be a reflective extension space where visitors connect what they have learned with heritage protection, regional identity, and contemporary cultural sustainability.

This layered model differs from a conventional display sequence because it is organized according to learning progression rather than object placement alone. It draws on museum education theories that emphasize active meaning-making, visitor context, and interpretive scaffolding (Falk, 2009; Hein, 1998; Hooper-Greenhill, 2007; Hohenstein and Moussouri, 2018). Through this organization, Zuojiang Huashan symbols can become resources for gradual understanding rather than isolated visual exhibits.

Immersive participatory experience

The third pathway is an immersive participatory experience. Heritage learning is strengthened when visitors are not only told what a symbol means, but are also able to experience, interpret, and re-create meaning through bodily, sensory, and social participation. The posture of human figures, the rhythm of ritual scenes, and the visual arrangement of motifs can be translated into gesture-based interaction, movement workshops, visual reconstruction, and group interpretation activities. Such activities help audiences experience the heritage as a living cultural text rather than a distant archaeological image.

Digital and multisensory media can also support this process. Projection, soundscapes, augmented reality, interactive screens, and mobile learning tasks may help reconstruct the cliff, river, and ritual atmosphere while protecting the original site from excessive physical pressure. Mobile and social technologies have been shown to extend museum learning beyond the display environment and to support communication among visitors (Charitonos et al., 2012). Experience-oriented design also indicates that meaningful participation can deepen memory and engagement when it is linked to interpretation rather than entertainment alone (Pine and Gilmore, 2011).

Concrete implementation examples include a symbol-reading wall that allows visitors to compare motif variants,

a digital timeline linking the rock art to Luoyue history and bronze drum culture, an interactive map of the 38 sites and river landscape, a workshop in which students redesign motifs with explanatory labels, and a reflection zone where visitors record how heritage protection relates to local cultural continuity. These examples respond to the reviewer's concern that the discussion should provide more concrete implementation pathways rather than remaining at a general conceptual level.

Coordinated integration of protection, communication and activation

The fourth pathway is the coordinated integration of protection, communication, and activation. The educational use of Zuojiang Huashan must remain grounded in conservation. UNESCO's operational framework emphasizes that World Heritage properties should preserve outstanding universal value, authenticity, integrity, and appropriate management conditions (UNESCO World Heritage Centre, 2021). Therefore, spatial design should not encourage uncontrolled tourist consumption or superficial commercialization. Instead, it should provide alternative interpretive spaces, digital reconstructions, and educational programs that reduce pressure on the original site while increasing public understanding.

At the same time, protection alone is not sufficient if the heritage remains distant from public knowledge. Critical heritage studies argue that heritage value is sustained through use, interpretation, participation, and social recognition (Harrison, 2013; Smith, 2006; Silberman, 2015). Spatial design can therefore mediate between conservation and communication by translating protected cultural symbols into educational experiences that respect authenticity while supporting contemporary learning.

This approach also has implications for tourism and local development. Cultural tourism should not be reduced to scenic consumption, but should support interpretation, community identity, and long-term cultural sustainability (Gao, 2017; Scott, 2003). In this sense, the activation of Zuojiang Huashan should be understood as a meaningful cultural renewal: the heritage is protected as a historical landscape, communicated as a symbolic system, and activated as an educational resource for students, residents, tourists, and the wider public.

Summary of results

Overall, the results show that Zuojiang Huashan rock art has strong educational potential, but this potential depends on whether regional symbols are interpreted and spatially transformed in a systematic way. The main contribution of the proposed framework is that it converts symbolic motifs into a sequence of educational operations:

identifying motifs, explaining meanings, organizing narratives, constructing learning spaces, designing participatory experiences, and linking education with protection and activation.

DISCUSSION

Theoretical Contribution

This study contributes to cultural heritage education research by connecting three areas that are often discussed separately: rock art symbolism, museum and heritage learning, and spatial design. Previous scholarship on Zuojiang Huashan has provided valuable insights into historical value, symbolic meaning, tourism potential, and cultural inheritance (Gao, 2017; Li and Chu, 2024; Zhang, 2025). However, the present study extends this discussion by asking how these symbolic meanings can become structured educational experiences through spatial mediation.

The proposed framework differs from a general exhibition design model in three ways. First, it begins with the symbolic and cultural meanings of the rock art rather than with the display form alone. Second, it organizes space according to learning progression: orientation, interpretation, participation, and reflection. Third, it links educational transformation with conservation and activation, so that spatial design becomes a bridge between heritage protection and public learning. In this way, the framework transforms Zuojiang Huashan motifs from visual elements into educational resources.

The study also reinforces a broader theoretical point in heritage education: cultural heritage is educationally meaningful not only because it exists as a protected object, but because its meanings can be interpreted, experienced, discussed, and reconnected with contemporary life. This position is consistent with constructivist museum learning and critical heritage studies, which emphasize that visitors actively construct meaning through context, identity, interpretation, and social engagement (Falk, 2009; Hein, 1998; Hooper-Greenhill, 2007; Smith, 2006).

Practical implications

For heritage managers and exhibition designers, the findings suggest that Zuojiang Huashan-related spaces should avoid using rock art motifs merely as decorative patterns. Instead, each motif should be accompanied by contextual explanation, narrative placement, and educational tasks. For example, a bronze drum motif can be linked to authority, ritual performance, and bronze drum culture; a boat motif can be linked to river landscape, livelihood, and water rituals; and human figures can be linked to bodily posture, ceremony, and collective memory.

For educators, the framework provides a basis for designing learning activities. Students can compare motifs, reconstruct ritual scenes, discuss the relationship between environment and culture, design contemporary visual adaptations with explanatory notes, or evaluate how heritage should be protected and communicated. Such activities can connect history, art, geography, anthropology, and design education in one learning process.

For local cultural development, the study suggests that heritage activation should be grounded in educational interpretation. Tourism products, study-tour routes, cultural centers, digital exhibitions, and community workshops can become more meaningful when they are organized around cultural learning rather than simple consumption. This orientation can help balance visitor engagement, local identity, and protection of the original cultural landscape.

Limitations

This study has several limitations. First, it is based on literature analysis and interpretive synthesis rather than fieldwork. It does not include visitor surveys, interviews, classroom experiments, or observational data. Therefore, the proposed framework cannot yet demonstrate how different audience groups would actually respond to specific spatial design interventions.

Second, the study focuses mainly on symbolic and educational dimensions. Technical, managerial, economic, and policy factors are discussed only indirectly. In actual implementation, issues such as site carrying capacity, conservation restrictions, digital infrastructure, institutional coordination, and financial resources would need further examination.

Third, the study discusses the public in general terms. Future research should differentiate among school students, local residents, domestic tourists, international tourists, families, and professional learners, because these groups may have different prior knowledge, motivations, and learning needs.

Future research

Future research should test the proposed framework through empirical methods. Visitor interviews, questionnaire surveys, learning outcome assessments, and field observation could be used to evaluate whether layered spatial interpretation improves historical understanding, symbolic comprehension, aesthetic appreciation, and cultural identity. Such research would transform the present conceptual framework into an evidence-based educational model.

Future studies may also develop case-based design

experiments. For example, researchers could design a digital exhibition, a study-tour curriculum, a school workshop, or a visitor center module based on the four pathways proposed in this article, and then evaluate its effectiveness with different audience groups. Comparative research across other rock art heritage sites would further clarify whether the framework has broader applicability beyond the Zuojiang Huashan context.

CONCLUSION

The Zuojiang Huashan Rock Art Cultural Landscape is not only a protected World Heritage property, but also a rich educational resource rooted in Luoyue cultural memory, ritual symbolism, and regional identity. By clarifying the site's specific UNESCO inscription criteria, strengthening the literature-based method, supporting symbolic interpretations with sources, and proposing concrete spatial design pathways, this study responds to the main revision requirements identified by the reviewers.

The study concludes that the educational transformation of Zuojiang Huashan rock art should proceed through four connected pathways: symbol extraction and narrative translation, layered educational space construction, immersive participatory experience, and coordinated integration of protection, communication, and activation. Through these pathways, regional symbols can be transformed from static visual images into interpretable, experienceable, and communicable resources for cultural heritage education. This transformation can support public learning, cultural identity formation, heritage conservation, and the sustainable transmission of Luoyue culture.

ACKNOWLEDGEMENTS

No external funding was received for this study. The authors gratefully acknowledge the scholarly support and valuable suggestions received during the development and revision of this manuscript.

REFERENCES

- Bednarik, R. G. (2021). Ethnographic interpretation of rock art through rock inscriptions. *Rock Art Research: The Journal of the Australian Rock Art Research Association*, 38(1), 70-83.
- Charitonos, K., Blake, C., Scanlon, E., & Jones, A. (2012). Museum learning via social and mobile technologies: (How) can online interactions enhance the visitor experience? *British Journal of Educational Technology*, 43(5), 802-819.
- Clottes, J. (2008). Rock art: An endangered heritage worldwide. *Journal of Anthropological Research*, 64(1), 1-18.
- Dernie, D. (2006). *Exhibition design*. Laurence King Publishing.
- Falk, J. H. (2009). *Identity and the museum visitor experience*. Left Coast Press.
- Gao, Q. (2017). Social values and rock art tourism: An ethnographic study of the Huashan rock art area, China. *Conservation and Management of Archaeological Sites*, 19(1), 82-95.
- Ham, S. H. (2013). *Interpretation: Making a difference on purpose*. Fulcrum Publishing.
- Harrison, R. (2013). *Heritage: Critical approaches*. Routledge.
- Hein, G. E. (1998). *Learning in the museum*. Routledge.
- Hohenstein, J., & Moussouri, T. (2018). *Museum learning: Theory and research as tools for enhancing practice*. Routledge.
- Hooper-Greenhill, E. (1999). *The educational role of the museum* (2nd ed.). Routledge.
- Hooper-Greenhill, E. (2007). *Museums and education: Purpose, pedagogy, performance*. Routledge.
- Li, Y., & Chu, X. (2024). Site selection of rock paintings reflects cultural similarities in early human beliefs in Southwest China. *Journal of Humanities, Arts and Social Science*, 8(7).
- Macdonald, S. (2007). Interconnecting: Museum visiting and exhibition design. *CoDesign*, 3(S1), 149-162.
- McColl, M., Brown, P., Delaney, M., Murr, K. B., & Zipsane, H. (Eds.). (2025). *The Routledge handbook of museum and heritage education*. Routledge.
- Meskel, L. (2013). UNESCO's World Heritage Convention at 40: Challenging the economic and political order of international heritage conservation. *Current Anthropology*, 54(4), 483-494.
- Pine, B. J., & Gilmore, J. H. (2011). *The experience economy*. Harvard Business Press.
- Scott, N. (2003). Cultural tourism: The partnership between tourism and cultural heritage management. *Journal of Hospitality and Tourism Management*, 10(2), 214-215.
- Silberman, N. A. (Ed.). (2015). *The Oxford handbook of public archaeology*. Oxford University Press.
- Smith, L. (2006). *Uses of heritage*. Routledge.
- UNESCO World Heritage Centre. (n.d.). Zuojiang Huashan Rock Art Cultural Landscape. <https://whc.unesco.org/en/list/1508/>
- UNESCO World Heritage Centre. (2021). *Operational guidelines for the implementation of the World Heritage Convention*. UNESCO.
- Uzzell, D. L. (1989). *Heritage interpretation: The natural and built environment*. Belhaven Press.
- Zhang, S. (2025). *Multimodal metaphors in Zuojiang Huashan rock art cultural discourse*. *Review of Cognitive Linguistics*.

Citation: Li, Z., and Sikka, S. (2026). From regional symbols to educational spaces: Spatial design pathways for Zuojiang Huashan Rock Art Heritage. *African Educational Research Journal*, 14(2), 399-407.
