

From Digitalization to Locality: An Analysis of the Local Awareness and Design Factors of the Sanxingdui Museum

Angxiao Zhang, Kai Wu*

Tianfu College of SWUFE, Chengdu, Sichuan, China

Abstract: This study aims to explore how to enhance local appeal through digital technology and effectively integrate local cultural elements, and analyze the design principles in the digital display of the Sanxingdui Museum. The research methods include literature review and case analysis. The digital display of the Sanxingdui Museum is analyzed in combination with AHP (Analytic Hierarchy Process), and the core design principles and related influencing factors that affect the perception of the locality are identified in combination with the locality theory. Through the deep integration of digital technology and local cultural elements, the Sanxingdui Museum has successfully enhanced cultural identity and immersion, and strengthened the interactive experience and emotional resonance of the audience. Digital technology not only plays an important role in the protection of cultural heritage, but also provides new possibilities for the display and inheritance of local culture. Through the application of digital technology, the Sanxingdui Museum has successfully enhanced its local appeal, enabling visitors to experience and identify with the Sanxingdui culture in digital technology.

Keywords: locality, digitalization, Sanxingdui Museum

1. Introduction

In recent years, the application of digital technology in museums has become an important means for the protection and dissemination of cultural heritage. Technologies such as virtual reality, augmented reality and 3D modeling not only efficiently preserve and manage cultural heritage, but also provide immersive experiences for audiences, significantly enhancing the effectiveness of cultural dissemination. However, the application of digital technology may also undermine the traditional spirit of cultural heritage due to improper presentation forms, and even lead to problems such as over-digitalization due to the excessive pursuit of technology.

Against this background, the concept of “locality” is particularly important in the display of cultural heritage. Initially applied in the fields of architecture and public art, “locality” is a creative approach that emphasizes the on-site nature and the particularity of the location [1]. In the research of digital humanities, the local design combined with digital technology helps to enhance the authenticity and sense of identity of cultural heritage.

This article takes the Sanxingdui Museum as a case and combines the AHP (Analytic Hierarchy Process) to explore how digital technology and design can enhance the local appeal of cultural heritage, and analyze its application and value in digital humanities research.

2. Overview of Digital Technology

Digital technology plays a unique role in the field of museums: preventing the loss of physical cultural relics through digital archiving and ensuring the long-term preservation of cultural heritage; Enrich the exhibition forms to enhance the audience’s participation and experience; Expand educational functions by leveraging technologies such as VR and AR to provide immersive learning experiences. This article defines the digitalization of museums as: the process of converting cultural heritage into shareable and renewable digital forms by applying digital collection, storage, processing, display and dissemination technologies, interpreting it from a new perspective, preserving it in a new way and meeting modern needs [2].

Literature research shows that although digital technology has brought many innovations and conveniences in the application of museums, it has also exposed some problems. For instance, Hui Bowen pointed out that although the audience holds a positive attitude towards the VR technology exhibition hall, due to the deficiencies in venue design, equipment configuration and content presentation, the actual experience effect is not good. VR technology often becomes a mere formality and fails to fully realize its potential [3]. Zhen Wen pointed out that the excessive reliance and overuse of digital technology may lead to the phenomenon of “pan-digitalization”, that is, the excessive pursuit of technological forms while neglecting content quality, thereby weakening the experience effect and educational significance of the audience [4]. It can be seen from this that there are currently problems such as excessive pursuit of technical forms, neglect of cultural connotations, discon-

nection between technology and content, and poor experience effects in the application of digital technology in museums. These problems urgently need to be improved in design and practice.

3. Locality

localization is a widely used concept that encompasses multiple fields such as culture, architecture, and art. In the field of architecture, locality refers to the integration of architecture with the region during the process of social development, emphasizing the ontological value of regional culture, and forming an interdependent relationship between architecture and the local state and cultural connotation [5]. In the field of artistic creation, locality refers to the close connection between an artistic work and its creative space, scene, geography and culture, emphasizing the establishment of a “blood-related” relationship between artistic creation, display and acceptance and the place [6].

The core of locality lies in highlighting the uniqueness of local culture, requiring the deep integration of design with local culture, while emphasizing the presence of designers and their active participation in cultural life. This research will be based on the theory of locality, combined with the key influencing factors in the fields of art creation and architecture, and use the AHP (Analytic Hierarchy Process) to analyze the local awareness factors of the Sanxingdui Museum, providing methodological support for digital humanities research and solving the practical difficulties in related practices.

4. Analysis of the Local Perception Factors of Digitalization in Sanxingdui Museum

4.1 Expert Interview Analysis

First, conduct expert interviews with the theme of visiting and experiencing the Sanxingdui Museum to construct a hierarchical analysis model. The interview format adopted semi-structured interviews. Eight interviewees of different ages and genders were selected from the experts. Combined with literature research, the main evaluation dimensions and elements of the impact of digitalization on locality were extracted in the form of questions and answers. The content of the questionnaire includes: basic information, questions related to the visiting experience, cultural identity and local awareness, interactivity and user experience, improvement suggestions, etc. Before the interview, briefly introduce the research background and the purpose of this interview to the interviewee. Quickly record the interview process through audio recording and notes for organization and summary.

4.2 Construction of Hierarchical Structure Model

Based on the above analysis, the overall goal is set as A1: the local awareness influencing factors of the digital application of Sanxingdui culture. The criterion layers are B1 cultural identity, B2 immersion, B3 interactivity, B4 authenticity, B5 aesthetic experience, and B6 emotional resonance. The specific influencing factors are numbered C1-C18 respectively. One side is analyzed through the AHP hierarchy, as shown in Table 1.

Table 1. Influencing Factors

Target layer	Criterion layer	Specific influencing factors
A1The local awareness influencing factors of the digital application of Sanxingdui culture	B1Cultural identity	C1Interpretation of Local Culture
		C2Application of Local Symbols
		C3Modern expression
	B2Immersion	C4Reproduction of the natural environment
		C5 3D scene interaction
		C6Sensory effect
	B3Interactivity	C7Interactive device design
		C8Manual interactive integration
		C9Sense of local participation
	B4Authenticity	C10Digital restoration of cultural relics
		C11Material process restoration
		C12Refinement of details
	B5Aesthetic experience	C13Qualitative localization
		C14Environmental integration
		C15Visual symbol
	B6Emotional resonance	C16Cultural resonance
		C17Participate in local activities
		C18Cultural story experience

4.3 Open-ended Online Questionnaire

In order to narrow down the scope of demands and select the more important ones, this study also adopted the research method of open online questionnaire, with the aim of expanding the sample size and reducing the subjective error caused by individual differences. In the open online questionnaire survey, participants were required to rate each demand in sequence, with 1 to 5 representing five levels of importance from very unimportant to very important respectively.

A total of 120 online questionnaires were collected. In order to prevent negative responses and ensure the validity of the data, questionnaires with too short filling times and obvious contradictions were screened and not included in the statistics. Therefore, a total of 100 valid questionnaires were obtained.

(1) Construct the judgment matrix.

The importance of each index was obtained through geometric mean, and the influence degree of each index on B1-B3 was assigned values. The constructed judgment matrix (part) is shown in Table 2.

Table 2. AHP Analytic Hierarchy Process Judgment Matrix (Part)

Mean value	Item	1	2	...	16	17	18
4.27	C1	1.000	1.020		0.790	0.794	0.834
4.3	C2	0.981	1.000		0.775	0.779	0.818
....							
4.06	C16	1.266	1.291		1.000	1.006	1.055
4.04	C17	1.259	1.284		0.994	1.000	1.050
4.17	C18	1.199	1.223		0.948	0.953	1.000

(2) Weight calculation.

First, calculate the product of each row of elements in C1 and take the NTH root of the product result. Secondly, the vectors are normalized, and finally the weight coefficients of each index are obtained, as shown in Table 3.

Table 3. Results of AHP Analytic Hierarchy Process

Item	Feature vector	Weight value	Maximum eigenvalue	CI value"
C1Interpretation of Local Culture	0.826	4.588%	18.000	0.000
C2Application of Local Symbols	0.810	4.500%		
C3Modern expression	0.821	4.558%		
C4Reproduction of the natural environment	1.123	6.241%		
C5 3D scene interaction	1.031	5.729%		
C6Sensory effect	1.078	5.991%		
C7Interactive device design	1.110	6.167%		
C8Manual interactive integration	1.140	6.335%		
C9Sense of local participation	0.921	5.114%		
C10Digital restoration of cultural relics	0.835	4.639%		
C11Material process restoration	1.031	5.729%		
C12Refinement of details	0.996	5.533%		
C13Qualitative localization	0.988	5.489%		
C14Environmental integration	1.107	6.149%		
C15Visual symbol	1.107	6.149%		
C16Cultural resonance	1.046	5.808%		
C17Participate in local activities	1.040	5.776%		
C18Cultural story experience	0.991	5.504%		

(3) Consistency test.

Consistency test determines whether the logic of the respondents' opinions is reasonable. Combined with the eigenvectors, the Maximum eigenvalue (18.000) can be calculated. CR is the consistency ratio, CI is the consistency index, RI is the average random consistency index, and n represents the matrix order. The CI value is used for the following consistency test,

and the results are shown in Table 4

Table 4. Random Consistency RI Table

n	3	4	5	6	7	...	12	13	14	15	16
RI value	0.52	0.89	1.12	1.26	1.36	...	1.54	1.56	1.58	1.59	1.5943
n	17	18	19	20	21	...	26	27	28	29	30
RI value	1.6064	1.6133	1.6207	1.6292	1.6358	...	1.6587	1.6631	1.6670	1.6693	1.6724

As shown in the results, when looking up the RI value in the table, it is 1.613, and the CR value is $0.000 < 0.1$. Therefore, the judgment matrix satisfies the consistency test, and the calculated weights are consistent.

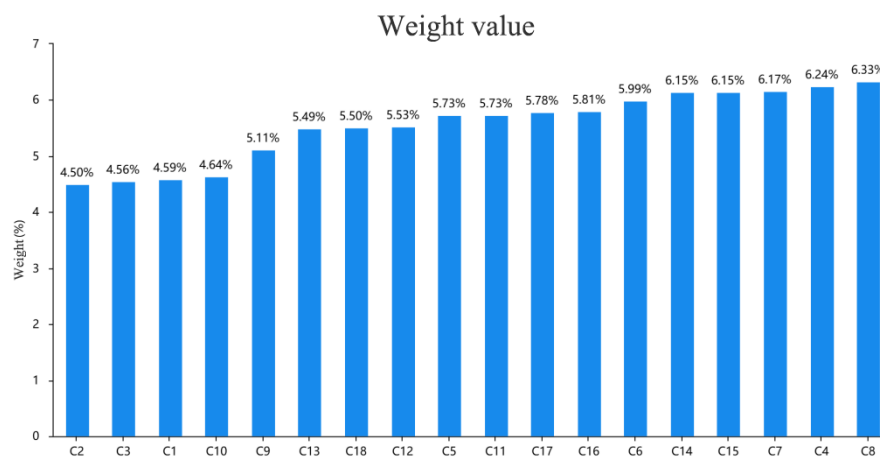


Figure 1. Weight values

Based on the weight results, this study adopts the cumulative weight method to screen the key factors: First, the 18 influencing factors were sorted in descending order of weight (with a weight distribution of 4.5%-6.33%), and then the weights were accumulated item by item until they reached 50%. Finally, 8 influencing factors with a cumulative weight of 48.62% were selected as the core factors that have a significant impact on the “local awareness of the digital application of Sanxingdui culture”.

Table 5. Core Influencing Factors

Criterion layer	Influencing factors	Weight value	Cumulative weight
B3 Interactivity	C8 Manual interactive integration	6.34%	6.34%
B2 Immersion	C4 Natural environment reproduction	6.24%	12.58%
B3 Interactivity	C7 Interactive Installation Design	6.17%	18.74%
B5 Aesthetic Experience	C15 visual symbol	6.15%	24.89%
B5 Aesthetic Experience	C14 Environmental integration	6.15%	31.04%
B2 Immersion	C6 Sensory effect	5.99%	37.03%
B6 Emotional Resonance	C16 Cultural Resonance	5.81%	42.84%
B6 Emotional Resonance	C17 participates in local events	5.78%	48.62%

4.4 Principles of Digital Localization Design for Sanxingdui

Table 6. Design principles

Design principle	Core factor	Core factor	Cultural goals
Hands-on co-creation and interactive experience	C8, C7	Manual practice + interactive installations	Deepen the sense of participation and cultural memory

Design principle	Core factor	Core factor	Cultural goals
Immersive recreation of nature and scenes	C4, C6	3D scene + multi-sensory design	Restore historical scenes and enhance the sense of immersion
Cultural aesthetics blend with the environment	C15, C14	Visual symbols + environmental adaptation	Highlight local aesthetics and spatial narrative
Emotional resonance and activity participation	C16, C17	VR narrative + festival collaboration	Establish emotional connections and cultural identities

(1) Hands-on co-creation and interaction: Integrating manual workshops (such as mold making and casting for bronze ware production) with digital installations (like the “Bronze Divine Tree Light and Shadow Prayer” gesture interaction), it enhances the sense of participation through “practice + technology” and deepens cultural memory.

(2) Immersive scene recreation: By integrating digital technologies (such as projection and sound effects) with natural elements, the natural and living scenes of ancient Shu are restored. Through multi-sensory design, the sense of immersion and exploration desire of tourists are enhanced.

(3) Integration of aesthetic environment: Extract the characteristic symbols of ancient Shu (such as the “Sky Eye” and “Earth Eye” symbolizing the worship of heaven and earth), incorporate them into architectural and exhibition designs, echo the historical context of the ruins, and enhance the local cultural expressiveness.

(4) Emotional activity resonance: Organize activities such as sacrificial parades and festival ceremonies to enhance cultural identity through contextualized participation and establish an emotional connection with the ancient Shu civilization.

5. Summary

This study takes the Sanxingdui Museum as a case and, from the perspectives of digitalization and locality, explores the methods of integrating digital technology with local culture to enhance the local appeal of cultural heritage. Through literature review and the Analytic Hierarchy Process (AHP), the core criteria and influencing factors such as cultural identity and immersion were identified and verified, revealing the key role of digital technology in cultural inheritance and the practical impact of the local concept. Research has found that Sanxingdui has achieved an organic combination of modern expression and local culture through design principles such as hands-on co-creation and the recreation of natural scenes. Digital technology has effectively enhanced cultural identity and immersive experience, highlighting the charm of ancient Shu civilization. The research provides theoretical support and a new practical perspective for the combination of museum digitalization and locality. In the future, the impact of technological application on cultural identity can be further explored to promote the development of locality theory in more cultural scenarios.

Acknowledgments

This research was funded by the Project “Research on Digital Innovation and Regional Perception Mechanism of Sanxingdui Culture in Deyang” of Deyang Digital Humanities and Art Research Center (Project Number: DYSZYS2025ZC10).

References

- [1] Yi Yuxiao. Rethinking Space - Site-Specific Art and Local Art [J] Shanghai Art Review.2018(05):61-64.
- [2] Wang Y X. The Digitization of National Cultural Heritage. Beijing: People Press, 2009. 8.
- [3] Hui Bowen. Application and Development of Virtual Reality (VR) Technology in Museums [D] Yunnan University,2019.
- [4] Zhen Wen, Huang Guanghui. Thoughts on the Digital Narrative Paradigm of Exhibitions in Contemporary Art Museums [J]. Journal of Nanjing University of the Arts (Fine Arts and Design),2024,(03):121-127.
- [5] Li Yongchang, Shao Qilong, Zhang Changdong. Research on the Design Strategy of Public Toilets in Nanjing Garden Expo Park from the Perspective of Local Characteristics [J]. Furniture & Interior Decoration,2023,30(05):133-139. DOI:10.16771/j.cn43-1247/ts.2023.05.020.
- [6] Zhang Yicong. A Preliminary Study on the Creative Shift of Music Audio-Visual Programs from the Perspective of Local Culture [J] China Television,2022,(06):33-39.