

Digital Preservation of Taishan Shadow Puppetry through Online Museum Design.

Meilin Li¹, Arunee Sriruksa², Nattapong Yamcharoen^{3*}

¹ Ph.D. Candidate, Faculty of Fine and Applied Arts, Khon Kaen University, Khon Kaen, Thailand.

² Faculty of Fine and Applied Arts, Khon Kaen University, Khon Kaen, Thailand.

³ Faculty of Communication Arts, Kasem Bundit University, Thailand.

Corresponding Author

Meilin Li

Ph.D. Candidate, Faculty of Fine and Applied Arts, Khon Kaen University, Khon Kaen, Thailand.

Email: meilin.l@kkumail.com

Abstract

Taishan shadow puppetry is a regional form of Chinese shadow theatre rooted in the cultural landscape of Mount Tai. Although the tradition continues to carry religious, educational, and entertainment functions, its contemporary transmission is constrained by a shrinking practitioner base, weakening engagement among younger audiences, changing media habits, and inheritance models that depend heavily on family or master–apprentice relationships. This study examines how an online museum can respond to these challenges without reducing living heritage to a static digital archive. The research draws on qualitative fieldwork in Tai'an, Shandong Province, conducted from October 2022 to October 2023. Participants comprised four key informants associated with shadow-puppetry institutions and inheritance, thirty purposively selected participants with sustained involvement in performances or heritage activities, and twenty general informants from the local public and consumers of related cultural products. Data were gathered through non-participant observation, structured and in-depth interviews, group interviews, and documentary materials. The findings identify four interrelated problems: limited succession, declining audience engagement, cultural dilution, and constrained transmission pathways. In response, the study develops an online-museum framework that links content communication, interactive communication, and value communication with Norman's visceral, behavioral, and reflective levels of emotional design. The resulting design emphasizes documentary preservation, layered learning, live interaction with inheritors, creative participation, cross-cultural comparison, and responsive access. The article argues that effective digital safeguarding should not only preserve representations of heritage but also support participation, interpretation, and intergenerational cultural attachment.

Keywords: Taishan shadow puppetry; intangible cultural heritage; online museum; digital heritage; emotional design; cultural transmission

Introduction

Shadow puppetry combines carved figures, light, music, singing, spoken narrative, and manipulation into a performance form in which material craft and embodied knowledge are inseparable. In the Taishan tradition of Tai'an, Shandong Province, this relationship is especially visible. Puppets are not simply objects to be viewed; they are instruments through which local stories, dialect, ritual memory, moral teaching, and performance technique are brought together. The tradition is also associated with the distinctive Shibuxian, or "Ten Skills," performance approach, in which a performer must coordinate puppet manipulation, vocal performance, and accompaniment with a high degree of bodily control.

The difficulty for safeguarding such a tradition is that its cultural value cannot be secured by preserving objects alone. This relational view is consistent with the 2003 UNESCO Convention, which treats intangible cultural heritage as practices, knowledge, skills, and associated cultural spaces that communities recognize as part of their heritage (UNESCO, 2003). The knowledge that makes the performance meaningful is distributed among practitioners, audiences, local institutions, stories, musical patterns, and social occasions. When any of these relationships weakens, the heritage may remain visible while becoming less culturally active. The dissertation on which this article is based shows that Taishan shadow puppetry has moved through changing social functions and survival conditions. In contemporary Tai'an, official recognition and cultural-tourism support have improved visibility, yet the practice still faces pressures from changing leisure habits, low returns for practitioners, a

demanding training process, and a widening distance between traditional performance conventions and younger audiences.

Digital heritage initiatives are often introduced as a solution to these pressures because they can extend access beyond the physical museum, support multimedia documentation, and allow cultural materials to be viewed repeatedly across time and place (Parry, 2007). Yet digital access is not equivalent to cultural transmission. An online repository that reproduces labels, images, and object records may preserve information while failing to reproduce the social encounter through which a living tradition is learned, questioned, and reinterpreted. Participatory museum approaches therefore emphasize interaction, interpretation, and user contribution rather than one-way display (Simon, 2010). For living heritage, this shift is particularly important because transmission depends on people recognizing the tradition as relevant to their own lives.

This study addresses that problem by asking how an online museum can be designed around the actual transmission challenges of Taishan shadow puppetry. Rather than beginning with technology and asking what can be digitized, the research begins with the cultural situation of the practice: who carries the knowledge, how audiences experience it, where transmission breaks down, and what forms of digital mediation may help. The article has two objectives. First, it identifies the principal contemporary challenges affecting the continuity of Taishan shadow puppetry. Second, it translates those findings into a user-centered online-museum framework that combines preservation, learning, interaction, and cultural reflection.

The paper contributes to digital heritage research in two ways. Empirically, it documents the relationship between practitioner scarcity, audience disengagement, content stagnation, and inherited modes of training in one regional Chinese performance tradition. Conceptually, it proposes that an online museum for intangible cultural heritage should operate across three linked forms of communication—content, interaction, and value—and should guide users from initial attraction to usable participation and, finally, to reflective cultural identification.

2. Cultural Context and Conceptual Approach

2.1 Taishan shadow puppetry as living regional heritage

Taishan shadow puppetry is embedded in the broader cultural world of Mount Tai. The dissertation traces the modern lineage of the local tradition from the late Qing period and shows how performances were historically associated with temple fairs, seasonal gatherings, local belief, entertainment, and moral education. Over time, the relative weight of these functions changed, but the form continued to connect local narratives with performance practice. Stories associated with Mount Tai, including the Shigandang tradition and other religious or legendary themes, became important parts of the repertory, while local dialect and vocal styles reinforced a specifically Tai'an cultural identity.

This regional embeddedness is a strength and a vulnerability. It gives the tradition a recognizable cultural character, but it can also create barriers when younger audiences have less familiarity with local dialect, opera-derived singing, ritual narratives, and extended performance durations. The same cultural features that make the tradition distinctive may therefore require mediation if they are to remain intelligible to audiences whose everyday media environment is dominated by short video, animation, games, and mobile interaction.

The material craft presents another safeguarding challenge. Shadow figures require multiple stages of preparation, drawing, carving, coloring, binding, and assembly. The performance itself demands years of practice. The research therefore treats the heritage as a linked system of material, performative, linguistic, and social knowledge rather than as a collection of decorative artifacts. This distinction becomes central to the online-museum design: digitization must make the process and relationships visible, not merely the finished puppet.

2.2 From digital collection to participatory online museum

Digital museums have expanded from basic collection databases toward multimedia interpretation, virtual environments, mobile access, and social participation. In this shift, user experience becomes part of curatorial practice. Interactive digital museums can combine access to collections with narrative, feedback, and exploration, thereby changing visitors from passive recipients into active interpreters (Cameron & Kenderdine, 2007). Accessibility is equally important: online cultural platforms can reduce geographic and temporal barriers, but their value depends on whether users can navigate, understand, and meaningfully engage with the content (Parry, 2007). For intangible cultural heritage, the participatory dimension is more than a technical enhancement. A living tradition is sustained through repeated performance, social recognition, learning, and adaptation. Participatory

heritage research similarly emphasizes that cultural meaning is socially produced and negotiated (Giaccardi, 2012). The online museum therefore needs to preserve evidence of practice while creating opportunities for audiences to ask questions, compare traditions, revisit movements, contribute ideas, and encounter practitioners as living cultural actors. In this sense, the goal is not to substitute for face-to-face transmission but to create additional routes into it.

2.3 Emotional design as a bridge between access and cultural attachment

The design framework draws on Norman's (2004) three levels of emotional design. At the visceral level, users respond to appearance, sensory qualities, and first impressions. At the behavioral level, attention shifts to usability, function, feedback, and the experience of doing something. At the reflective level, users interpret what the experience means in relation to memory, identity, values, and self-understanding. These levels are useful for heritage design because they prevent the museum from equating visual attractiveness with meaningful engagement.

Applied to Taishan shadow puppetry, visceral design concerns the immediate encounter with color, light, movement, carved forms, and performance imagery. Behavioral design concerns how easily users can explore historical material, understand craft processes, interact with practitioners, and create or share content. Reflective design concerns whether these encounters help users understand why the tradition matters, how it differs from other shadow-theatre traditions, and how it connects to regional cultural identity. The three levels are treated not as isolated stages but as a progression: visual attention supports participation, and participation creates conditions for reflection.

3. Methods

3.1 Research design and field setting

The study used a qualitative research design centered on Tai'an City, Shandong Province. Fieldwork was conducted from October 2022 to October 2023. The research combined cultural-historical investigation with observation of contemporary practice and audience-oriented inquiry. This design was chosen because the research questions concerned processes of inheritance, perceptions of relevance, cultural functions, and design expectations rather than population-level measurement.

The research proceeded through four overlapping phases. The preliminary phase collected historical and cultural materials and included on-site visits to understand the relationship between shadow puppetry and the local cultural environment. The audience-analysis phase examined awareness, interests, and expectations among students, enthusiasts, local participants, and other viewers. The conceptual-design phase translated field findings into a museum theme and information structure. The exhibition-design phase developed multimedia, interface, and interaction proposals intended to support both introductory learning and deeper exploration.

3.2 Participants

Participants were selected according to their relationship with Taishan shadow puppetry and the information required for each research objective. The dissertation distinguishes three groups. For clarity in this article, they are described as key informants, engaged/community informants, and general informants. In total, 54 people were included.

Group	n	Selection/role	Primary contribution
Key informants	4	Managers and principal inheritors associated with Taishan shadow-puppetry institutions	Historical transmission, current practice, institutional conditions, design priorities
Engaged/community informants	30	Purposively selected enthusiasts, venue/cultural-preservation personnel, and audience members with repeated participation	Observation of practice, audience experience, transmission problems, expectations for engagement

General informants	20	Tai'an residents familiar with the tradition and consumers of related cultural products	Public awareness, usability expectations, perceptions of relevance and cultural value
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Table 1. Participant groups in the qualitative field study.

3.3 Data collection and analysis

Data were collected through non-participant naturalistic observation, structured interviews, in-depth unstructured interviews, group interviews, and secondary documentary materials. Observation focused on audience interaction with shadow puppetry and was documented through field notes, photographs, and video where available. Structured interviews with general informants explored recognition of the art form and expectations for the research and digital platform. In-depth interviews with key informants focused on historical development, current survival conditions, inheritance, and major problems. Group interviews were used to obtain views from audience members, local participants, and consumers.

The materials were organized and interpreted qualitatively around the study objectives. Rather than applying statistical inference, the analysis compared recurring patterns across interviews, observation, and documentary sources. Attention was given to points of convergence between practitioner concerns and audience experience, particularly where those patterns had direct implications for the online museum. The design stage then translated these empirical concerns into content, interaction, and interface requirements.

Because the dissertation reports a design-oriented qualitative study rather than a controlled evaluation of a finished platform, the present article treats claims about museum effects as design propositions unless they were directly supported by field evidence. Quantitative claims in the dissertation that were not clearly linked to a documented measurement procedure are therefore not used as outcome evidence in this article.

4. Findings: Why Transmission Is Becoming Fragile

4.1 A narrow and demanding practitioner pipeline

The first challenge is the limited pipeline of people able and willing to sustain the tradition. Taishan shadow puppetry requires substantial time to learn both craft and performance. The Shibuxian performance method intensifies this difficulty because the performer must coordinate multiple actions and expressive forms. Interview material emphasizes that competence is achieved through long-term correction, repetition, and embodied practice rather than through short-term instruction.

Historically, transmission depended largely on family inheritance and master-apprentice relationships. These modes protected continuity and artistic discipline, but they also restricted access. The lineage described in the dissertation includes periods of family-based transmission and periods of non-family apprenticeship. The criteria for apprenticeship extended beyond technical interest to personal conduct, persistence, musical ability, and willingness to accept a demanding way of life. In contemporary conditions, such requirements compete with a wider range of occupations offering higher and more predictable returns.

This problem is not simply a shortage of learners. It is a mismatch between the time structure of traditional training and the opportunity structure of contemporary life. A digital platform cannot replace apprenticeship, but it can reduce the threshold for initial exposure. Repeated video, close-up documentation, step-by-step demonstrations, and searchable movement archives can make embodied techniques visible before a learner commits to formal training. In this way, the online museum can widen the top of the transmission funnel while leaving expert validation and advanced learning with practitioners.

4.2 Younger audiences encounter a gap of pace, language, and repertoire

A second challenge concerns audience engagement. Field materials describe a media environment in which short video, animation, games, concerts, and other immersive entertainment compete for attention. Against this background, traditional shadow-puppetry performances may appear slow, especially when stories unfold over long periods and depend on familiarity with historical or mythological narratives.

Younger interviewees also described content as repetitive when performances relied heavily on familiar stories such as Journey to the West or Mount Tai legends without visible reinterpretation. This does not mean that traditional repertory has lost value. Rather, the issue is that heritage content is often presented without a bridge

between inherited narrative and contemporary experience. The absence of that bridge makes the tradition easier to admire as an old art form than to adopt as part of present cultural life.

Language adds another barrier. Tai'an dialect and opera-derived singing are important markers of regional identity, yet they can reduce comprehension among younger people who are more accustomed to Mandarin and contemporary musical forms. Some participants reported following puppet movement while missing parts of the sung narrative. From a safeguarding perspective, replacing dialect would weaken the very distinctiveness that preservation seeks to protect. A more productive response is mediation: subtitles, annotated lyrics, optional Mandarin explanations, short contextual introductions, and side-by-side audio examples can preserve local expression while improving access.

4.3 Visibility without context can produce cultural dilution

The fieldwork identifies a third tension between visibility and cultural depth. Shadow puppets are increasingly encountered as framed decorations, souvenirs, or cultural-creative products. Such products can create income and public exposure, but when the object is detached from performance, music, story, and local belief, audiences may understand shadow puppetry primarily as a carving craft. The cultural object survives while the performance system becomes less visible.

This finding has a direct implication for digital curation. High-resolution images of puppets are valuable, but they should be embedded within a chain of interpretation: material selection, carving process, color symbolism, joint assembly, manipulation, voice, story, performance context, and practitioner biography. The online museum should therefore connect the object to the action that gives it cultural meaning. A puppet image becomes more informative when users can rotate it, see how its joints move, hear the associated performance, and watch the same figure operated by an inheritor.

4.4 Existing transmission routes are too socially concentrated

The fourth challenge is structural. Family and master-apprentice transmission remain culturally important, but they concentrate learning within a small social network. Museums, schools, workshops, tourism sites, and digital media have begun to expand this network, yet these channels are not always integrated. The dissertation documents multiple survival strategies, including performance, research and training activities, cultural-product sales, collaboration with public institutions, and attempts to connect shadow-puppetry elements with contemporary media.

The implication is that digital safeguarding should operate as a connector rather than as a separate archive. It can bring together practitioners, schools, researchers, local residents, and casual audiences within the same information environment. A visitor who begins with a short performance clip should be able to move toward a craft tutorial, an inheritor interview, a school resource, a live question-and-answer session, or a local workshop. In this model, the museum does not claim to be the place where heritage lives; it directs users toward the people and practices through which heritage continues to live.

Table 2. From transmission problems to digital-museum design requirements.

Observed challenge	Cultural consequence	Design response
Narrow practitioner pipeline; high learning cost	Embodied knowledge becomes concentrated in very few carriers	Close-up documentary records, repeatable tutorials, searchable technique archive, pathways to offline learning
Declining younger-audience engagement	Heritage becomes respected but socially distant	Short introductory narratives, subtitles, layered explanations, livestream dialogue, creative prompts
Commodification and object-centered display	Puppets are separated from performance context	Link object records to making, music, story, manipulation, and practitioner biography
Family/apprenticeship-centered transmission	Limited access to knowledge networks	Community features, school resources, practitioner contact,

		cross-institution links and open educational access
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5. A Research-Informed Online Museum Framework

5.1 Three linked communication functions

The design response is organized around three forms of communication: content communication, interactive communication, and value communication. Content communication answers the basic questions of what the tradition is, how it developed, how puppets are made, how performances work, and who carries the knowledge. Interactive communication turns the user from a reader into a participant through live exchange, creative tools, questions, and guided exploration. Value communication connects the experience to cultural meaning by helping users interpret why the tradition matters within Mount Tai culture and why its continuation is relevant beyond nostalgia.

These functions address different points in the transmission process. Content reduces the knowledge gap. Interaction reduces social distance. Value communication reduces the identity gap between an inherited practice and contemporary users. The online museum is therefore designed not as a sequence of pages but as a pathway through which a user can move from curiosity to understanding, from understanding to participation, and from participation to reflection.

5.2 Mapping emotional design onto heritage experience

Norman's three levels of emotional design provide the experiential logic for this pathway. At the visceral level, the museum uses the visual language of shadow puppetry—warm amber light, dark backgrounds, carved silhouettes, moving shadows, and short performance sequences—to create immediate recognition. At the behavioral level, the platform emphasizes clear navigation, responsive layout, practical learning tools, and visible feedback. At the reflective level, the museum uses stories, comparison, practitioner voices, and user reflection to turn information into cultural meaning.

Table 3. Emotional-design logic for the Taishan Shadow Puppetry Online Museum.

Emotional level	Primary user need	Museum mechanisms	Heritage objective
Visceral	Attention and immediate cultural recognition	Performance imagery; warm screen-light palette; short video; high-resolution puppet details	Create interest without simplifying the tradition into generic spectacle
Behavioral	Usability, learning, participation	Three-click navigation; technique tutorials; subtitles; message board; live sessions; downloadable learning materials	Make cultural knowledge understandable and actionable
Reflective	Meaning, identity, memory	Practitioner narratives; heritage log; global comparison; contemporary reinterpretation; prompts for user stories	Encourage cultural recognition and long-term attachment

5.3 Information architecture and interface

The proposed interface uses a shallow hierarchical structure so that core content can be reached with minimal navigation. The first level provides three broad routes: history and development, craftsmanship and performance, and exploration/participation. The second level contains themed modules such as a chronological timeline, making-process explanations, performance clips, practitioner interviews, and cultural-context pages. The third level supports deeper interaction through live demonstrations, creative tools, comparison features, and specialist resources.

This structure responds to user diversity. A casual visitor can enter through large, simple choices and receive a coherent introduction without facing a dense archive. An enthusiast can continue into detailed process materials. A researcher or advanced learner can use filters, long-form interviews, and documentary records. Progressive disclosure is used to prevent information overload while preserving depth for those who want it.

The visual design draws from the physical conditions of shadow performance rather than applying decorative heritage motifs superficially. Amber, black, and brown tones recall the illuminated screen, leather materials, and the mountain environment. The interface combines traditional visual cues with modern typography and responsive design so that cultural atmosphere does not reduce readability. The goal is a contemporary cultural interface, not a simulation of an antique page.

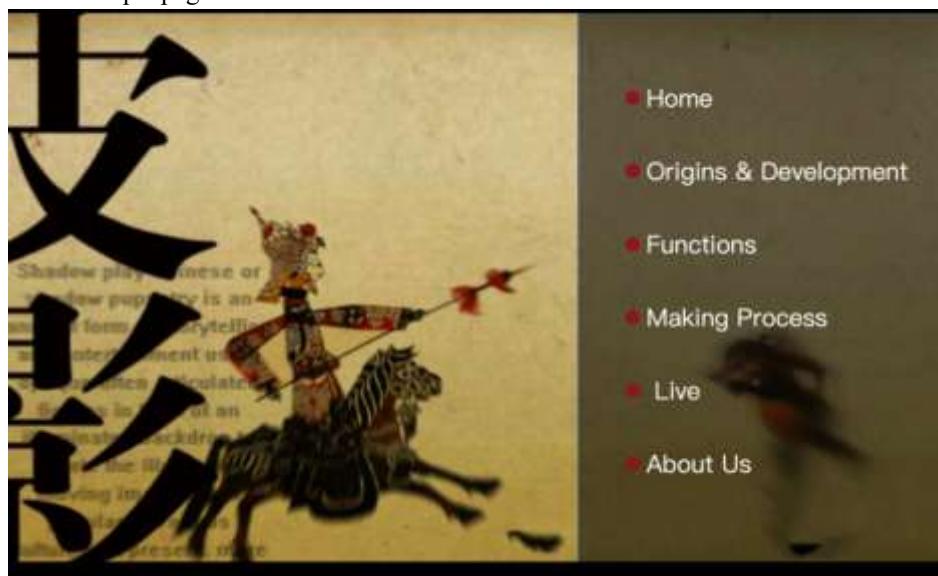


Figure 1. Homepage prototype for the Taishan Shadow Puppetry Online Museum (reproduced from the dissertation design).

5.4 Interaction as a form of transmission

The most important distinction between the proposed museum and a static digital archive lies in its interactive functions. A creative message board allows users to ask practitioners questions, propose contemporary stories, or respond to performance themes. This feature lowers the psychological barrier that often surrounds officially designated heritage by signaling that the tradition can be discussed rather than only admired.

Livestream or recorded dialogue with inheritors extends this principle. Users can observe manipulation techniques, ask about difficult movements, and hear practitioners explain why particular details matter. Repeated video viewing also supports learning because embodied actions that would be difficult to capture in written description can be slowed, replayed, and compared. This use of digital media does not convert mastery into a self-guided tutorial; rather, it makes expertise more legible and can motivate further contact with practitioners.

A global shadow-puppetry comparison module is proposed at the reflective level. By comparing material, manipulation, performance organization, and visual conventions across traditions such as Turkish Karagöz and Indonesian Wayang Kulit, users can see Taishan shadow puppetry as part of a broader family of shadow theatre while also recognizing its local specificity. Comparison is therefore used to deepen cultural understanding rather than to rank traditions.

5.5 Digital archiving should document relationships, not just files

A sustainable archive should link digital objects to their cultural relationships. A puppet record, for example, should connect to the maker, material, carving stage, character role, repertoire, audio, manipulation demonstration, and historical context. An interview should be indexed not only by speaker and date but by technique, story, place, and transmission topic. Such relational documentation makes the archive useful for education and research while preserving the connections through which intangible heritage gains meaning.

The dissertation proposes the use of multimedia, panoramic display, 3D representation, VR/AR, cloud services, and other digital technologies. These tools can strengthen access, but the study suggests that technology should be selected according to cultural purpose. A 3D model is valuable when it reveals construction, joints, or carving

detail; VR is valuable when spatial context contributes to interpretation; livestreaming is valuable when it restores social contact with practitioners. Technology becomes secondary when it does not clarify, connect, or enable participation.

6. Discussion

6.1 Digital safeguarding as an extension of the heritage ecosystem

The findings suggest that the principal problem facing Taishan shadow puppetry is not a simple lack of documentation. The tradition already has public visibility, recognized inheritors, physical venues, and cultural-tourism presence. Its fragility lies in the weakening of relationships among practitioners, learners, audiences, performance contexts, and everyday cultural relevance. This supports a broader view of digital safeguarding: the online museum should extend the heritage ecosystem rather than merely duplicate a physical display.

From this perspective, preservation and innovation are not opposites. Preservation establishes the reference points that make innovation culturally accountable: documented technique, practitioner knowledge, local language, repertory, and historical context. Innovation then creates new routes through which people can encounter and reinterpret those reference points. The risk is not change itself but change without connection. A digital museum can reduce that risk by keeping reinterpretation linked to authoritative cultural records and practitioner voices.

This approach also changes the role of the audience. In a conventional display model, visitors receive knowledge selected by the institution. In the proposed model, users can move between receiving, questioning, practicing, comparing, and contributing. This is consistent with participatory museum thinking, but it is especially consequential for intangible heritage because participation is one of the conditions of continuity. The audience is not automatically a bearer of the tradition, yet meaningful participation can create the interest, literacy, and social connection from which future learning develops.

6.2 Why emotional design matters for living heritage

Emotional design is sometimes treated as a matter of visual appeal. In this study, its greater value lies in structuring depth. Visceral design creates a reason to stay. Behavioral design makes the next step possible. Reflective design gives that step cultural significance. If the first level is missing, younger users may never enter. If the second is weak, a visually attractive site becomes difficult to use. If the third is absent, interaction risks becoming entertainment detached from heritage meaning.

The framework is therefore useful for resolving a common tension in digital heritage: how to make traditional culture accessible without trivializing it. Short videos, interactive tools, contemporary story prompts, and responsive interfaces are not inherently superficial. Their cultural quality depends on where they lead. In the proposed design, lightweight entry points are connected to deeper documentary and interpretive layers. A user may begin with a striking shadow image but can continue to the making process, the performer's explanation, the local story, and the social context.

6.3 Implications for other forms of intangible cultural heritage

Although the framework was developed for Taishan shadow puppetry, its logic may be relevant to other living traditions that combine objects, embodied technique, oral knowledge, and community context. Four design questions are transferable: What knowledge is at greatest risk of disappearing? Where does the audience lose comprehension or interest? Which social relationships currently carry the tradition? Which digital functions can strengthen those relationships without claiming to replace them?

The answers will differ by heritage form. For a musical tradition, audio comparison and notation may be central; for craft, high-resolution process documentation may matter more; for ritual, community authority and access restrictions may be decisive. The important point is that the platform should be derived from the transmission ecology of the heritage rather than from a standard list of digital features.

7. Conclusion

Taishan shadow puppetry remains culturally rich but faces a contemporary transmission problem shaped by practitioner scarcity, changing audience habits, linguistic and repertory distance, commodification, and socially concentrated learning pathways. The fieldwork indicates that these challenges are interrelated. Fewer audiences reduce economic and social incentives for practitioners; fewer practitioners narrow opportunities for learning;

limited innovation reduces relevance; and object-centered visibility can obscure the performance system that gives the craft meaning.

An online museum can address parts of this problem when it is designed as more than a digital storage space. The framework developed here combines content communication, interactive communication, and value communication with visceral, behavioral, and reflective design. It proposes a pathway from attraction to participation and from participation to cultural reflection. Core functions include documentary preservation, layered learning, live practitioner interaction, creative participation, cross-cultural comparison, and responsive access.

The central argument is that digital safeguarding should preserve relationships as carefully as it preserves files. Taishan shadow puppetry is sustained by connections among materials, gestures, stories, voices, places, practitioners, and audiences. A successful online museum can make those connections visible and easier to enter. It cannot replace embodied apprenticeship or local performance, but it can create new points of contact through which a living tradition becomes understandable, discussable, and relevant to another generation.

7.1 Limitations and future research

This study has several limitations. First, it is a qualitative case study concentrated in Tai'an and does not claim statistical representativeness. Second, the participant categories were designed around the practical needs of the dissertation and did not include a controlled comparison of age groups or digital-literacy levels. Third, the online museum was developed as a design outcome, but the dissertation does not report a longitudinal usability study with standardized measures of learning, engagement, or cultural identification. The present article therefore avoids treating proposed design benefits as proven effects.

Future research should test the platform with clearly defined user groups, including school students, local young adults, heritage enthusiasts, practitioners, and researchers. Mixed-method evaluation could combine task-completion data, usability scales, learning tests, interviews, and follow-up measures of return visits or offline participation. A second priority is governance: future studies should examine how practitioners control representation, attribution, copyright, culturally sensitive content, and the long-term updating of digital records. Finally, research should compare online-museum use with participation in physical workshops and performances to determine where digital access complements, rather than substitutes for, embodied cultural transmission..

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