

Cloud-based Digital Dissemination of Nüshu: Reviving an Endangered Intangible Cultural Heritage in Modern China

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Abstract. Nüshu is an extraordinary symbol of female solidarity and cultural expression in Jiangyong County, Hunan Province, China. It is the world's only known script developed and used exclusively by women. Despite its rich anthropological, linguistics, and historical importance, however, it is now at risk of disappearing due to the rapid pace of modernisation. This paper investigates the digital preservation and sharing of Nüshu using modern techniques such as websites, social media networks, and VR tools. Through a mixed-methods approach to a literature review, field research, interviews, and digital practice, we created a platform, which we named as Yunshang Nüshu, aimed at facilitating education and public engagement. The findings of the research reveal that digital methods enhance awareness and engagement with Nüshu culture to a considerable extent, especially among younger audiences. The paper concludes by proposing recommendations for enhancing sustainability and scalability for similar ICH preservation projects.

Keywords: Cloud-based Digital Dissemination, Nüshu, Cultural Heritage, Modern China.

1. Introduction

Based on syllabic script, Nüshu (女书, literally "women's script") was developed and used exclusively by women in Jiangyong County, Hunan Province. It evolved as a clandestine means of communication allowing women to exchange poetry, autobiographies, and letters in an oppressive Confucian landscape that did not appreciate female literacy [1]. It takes dialects as its base, turning into an autocephalous writing system, about 600 letters.

As of 2006, Nüshu has been listed as a national intangible cultural heritage (ICH) of China by the Chinese government [2]. Yet, it has fallen into relative disuse. Few practitioners of the art remain, and fewer young people have even heard of it. This reduction has been accelerated by modernization of education, process of gender equality and migration into urban areas [3].

Conservation and revitalization of Nüshu is not merely the preservation of a system of written characters, but rather a restoration of a continuum of historical, emotional, and social memory in which this culture of women's resistance and creativity are contained. The paper will discuss research on how digital tools could potentially help restore and help disseminate Nüshu culture.

We carried out field research in Jiangyong, established a digital learning website, and promoted Nüshu in digital development platforms like Xiaohongshu and WeChat. This approach led to the design of our project, Yunshang Nüshu, which contains both informative and interactive aspects that allow for online learning, writing, and interaction with the culture.

The main research questions to which this study aims to provide answers are:

- Does digitally getting the word out about Nüshu really help get the word out to the public?
- What do you see as the technical/social challenges in digitizing Nüshu?
- what can this case study tell us about applying digital tools to ICH more generally?

2. Literature Review

The resurgence of interest in Nüshu following its rediscovery in the last decades of the 20th century, has led to a growing research on it. The late linguist Zhao Liming initiated the process of collection and interpretation of Nüshu texts, which has eventually led to changes like The Complete Collection

of Chinese Nüshu and Nüshu Standard Calligraphy Guide [4]. The history of thought published in these works set the stage for conceptualizing its linguistic and cultural importance.

According to anthropological studies, Nüshu serves as an expression for women within a male-dominated society [5]. The emotional and poetic quality of Nüshu has led scholars to claim that it represents a distinctly "gendered memory" that provides critical perspective into the everyday lives of rural Chinese women in past centuries [6-7].

On the digitization front though its still infrequent. While some institutions, such as Tsinghua University, built a set of Nüshu characters for inclusion into Unicode [8], there have been few projects that create any interactive or immersive platforms for learning and engagement. Unlike global ICH digital projects, such as digital archives set up by UNESCO, or the Kabuki digitization project in Japan, [9] [10], the Nüshu community exists without large-scale digital infrastructure or sustained funding.

Literature addressing new media in cultural heritage emphasizes the potential of digital storytelling, VR experience, and social media campaign, for reviving endangered culture [11]. Platforms like WeChat, Douyin, and Xiaohongshu are providing more and more opportunity for cultural promotion in China, particularly among youth [12].

The findings reveal a noticeable gap: with academic and governmental initiatives focusing on documentation and policies, just a handful of efforts have examined public-oriented digital dissemination of Nüshu. By combining fieldwork, digital content creation, and suggestions for platform-based engagement, this research fills that gap with a model for a more widespread digital heritage revival.

3. Methodology

The study takes a mixed-methods approach, including qualitative field research and digital development and public engagement analysis. The research took place in four phases in 2025.

3.1. Field Research

Then we did spot investigations in Jiangyong County, through which we visited the Nüshu Ecological Museum and conducted interviews with local experts, practitioners and residents. Additionally, we gathered primary source materials: handwritten Nüshu scripts, calligraphy samples, and museum exhibits [13]. As below in Figure 1, content development for online platforms was supported by video and photo documentation.

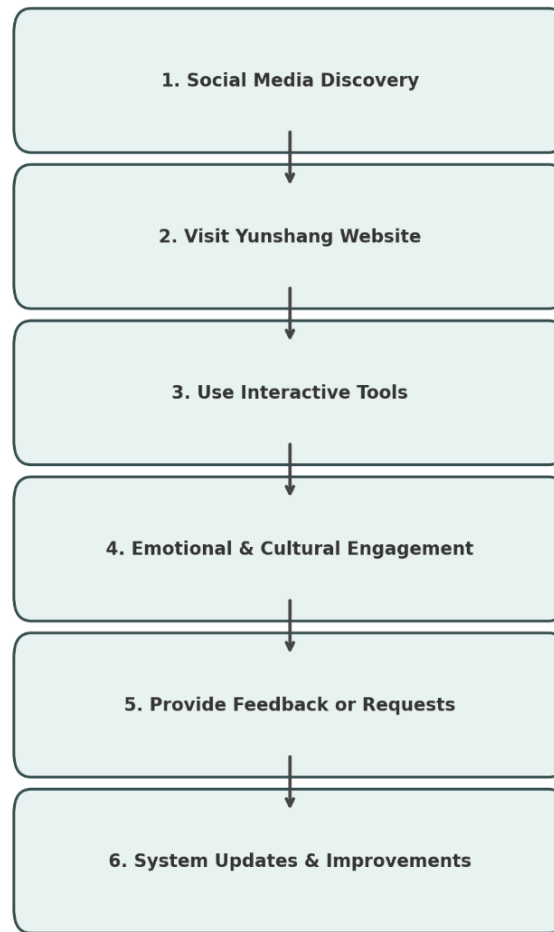


Figure 1. Procedures of data collection

3.2. Surveys and Interviews

We conducted two surveys: one for local university students ($n = 327$) to understand their awareness and perceptions of Nüshu; the other for visitors at the Jiangyong museum ($n = 81$). Three Nüshu inheritors as well as two cultural officials were the subjects of semi-structured interviews. Qualitative insights were extracted using thematic analysis.

3.3. Data Analysis

SPSS was used to analyse the quantitative survey data. Thematic coding was used to analyze qualitative interview transcripts. The procedures are conducted as shown in Figure 2 in the following procedure:

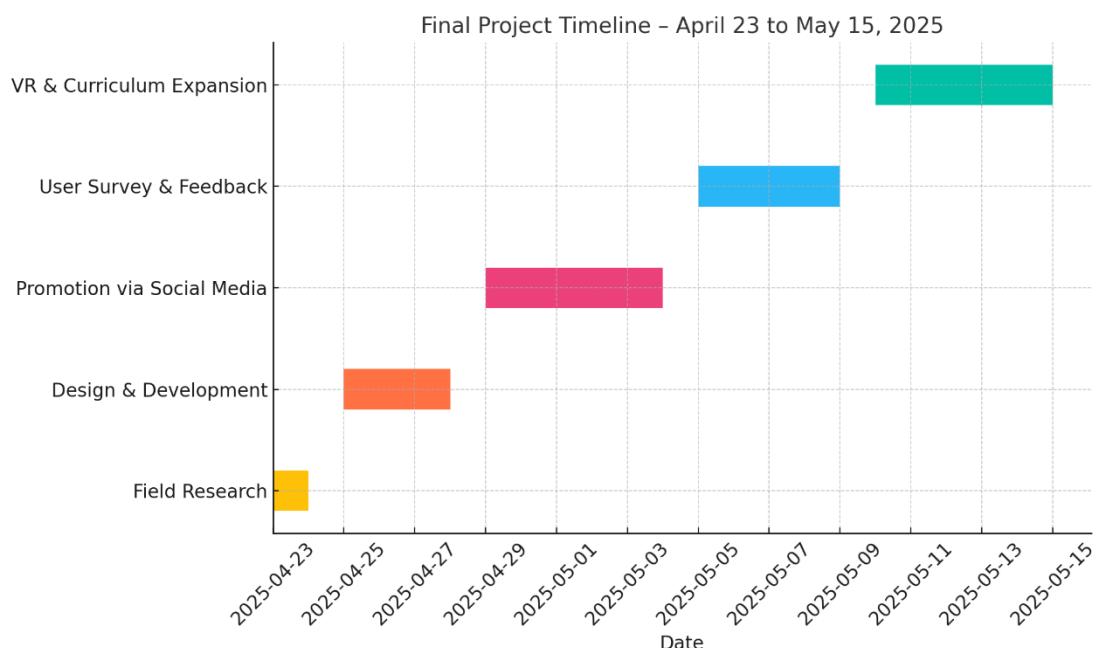


Figure 2. Timeline of data collection and analysis

4. Results

The content of this section includes qualitative and quantitative evidence gathered from fieldwork, survey, platform traffic analysis, and user comments, to evaluate successes and limitations of the digital dissemination of Nüshu.

4.1. Field Observations and Stakeholder Interviews

In visiting the Jiangyong Nüshu Ecological Museum, they found current Nüshu preservation efforts to be bleak and somewhat sobering. Although the museum contains the world's only known female writing system, its cultural significance seemed reflected in the incredibly low foot traffic of the visitors, most of whom were there via guided tour rather than by personal volition. Foot traffic typically peaked in the mere dozens during rush hours, and the bulk of visitors were middle-aged or older, illustrating a generational gap in love for the billboards [14-15].

Lack of interactive learning opportunities the exhibits largely consisted of static posters, framed pieces of calligraphy, and mannequins dressed up in traditional garb. Although these elements communicated density with a sense of historical accuracy, they did not provide access points for the next generation of digital audiences, who are used to interacting with the kind of dynamic media that is more directly agentic. There were no touchscreen panels, mobile app integrations, or augmented reality features to power hands-on discovery. Multimedia elements (e.g., short loops of video) in these few cases were not subtitled, had no spoken guidance from voiceovers, and no options for user control.

Three leading Nüshu holders met us to discuss their status on location and made a strong impression that the tradition is especially imperiled. The three women shook their heads in real concern over the dwindling and aging practitioner population, “As far as we know there are no official apprentices in progress. Another practitioner, who is in her 70s, feared that “the last generation to write Nüshu fluently is also the last generation that lived Nüshu.” Some expressed a kind of cultural urgency, where recent movement to modernize Nüshu for mass consumption liable to revert it to only a visual motif, separate from the social, emotional, and linguistic space the Nüshu has occupied.

Significantly, they were all open to the possibility of using digital tools but each stressed the importance of ensuring any such use was accurate, dignified and remained in context. As one heir told me on our recent phone call, if digital tools can do something for Nüshu, we should be behind that but we must also teach it correctly. This highlights the double duty digital cultural workers must

perform: to update access and attraction and also to protect the epistemic essence and emotional resonance that provide true value to a heritage practice.

4.2. Knowledge and Perceptions of University Students

The first part was a face-to-face online survey distributed to 327 university students from different universities, which discovered an alarming ignorance about Nüshu. An overwhelming 83.2% of respondents claimed that they had never known about Nüshu before the survey, indicating that the script – and despite the title of national intangible cultural heritage, has seldom appeared in education and media narratives at all. Another 12.4% said they were only slightly familiar with, frequently mistaking Nüshu for a dialect, embroidery style, or folk music tradition. Just 4.4% of students reported hearing of Nüshu, and many of that minority were inaccurate in their follow-up answers regarding the language's structural and cultural role.

At the same time, the results seem to indicate some hope with 76.1% of all respondents wanting to study Nüshu if the online resources were available. Additionally, 92.4% responded that they would be more likely to engage with learning if it was presented in a more immersive format — like virtual reality, a gamified experience, or a simulation. It not only illustrates the ability of digital tools to address the lacunae in cultural knowledge but also the expectations of the younger generations in terms of accessibility, experience and absorption of heritage.

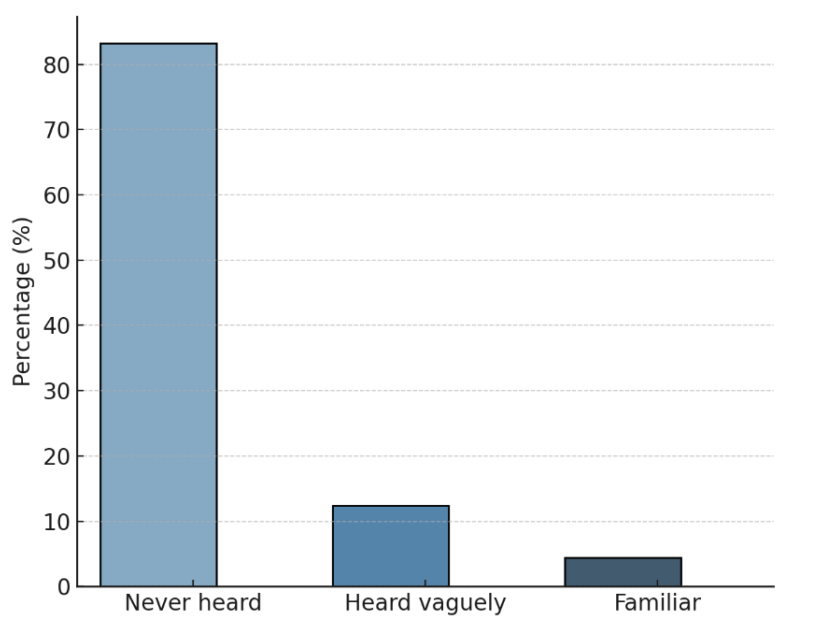


Figure 3. Awareness of Nüshu Among University Students

4.3. Visitor Feedback on the Museum

Our study involved a paper-based survey distributed to 81 visitors at the Jiangyong Nüshu Ecological Museum, which helped us understand how the general public currently perceives the exhibition experience and their attitudes towards different digital enhancements. The number of responses was relatively small, but the trends were fairly consistent and could highlight problems many legacy cultural institutions in China are facing.

In particular, 64.2% of the respondents stated that there has been a lack of interactive or engaging content at the museum, and that the presentations have been, “informative and boring with no visual [input].” The static presentation made it difficult for visitors to emotionally or intellectually access the deeper stories behind Nüshu, but the calligraphy exhibits and some historical photographs were of interest. Others voiced their disappointment with the lack of video guides, personal stories, and multimedia resources that could provide some context on what they were looking at.

Digital media could contribute greatly to accessibility and experience, agreed 70.3% of participants. And when offering the idea of QR-coded content, touchscreens, AR specs or an activity-

based app with translations between people and characters, reaction among many was favorable. Visitors expressed that playing brief voice recordings of Nüshu songs and recitations would help them experience one important sensory component of how this script was historically sung or spoken, and which would enhance the emotional experience of the site visit.

Most Forcefully, 88.6% of those surveyed agreed that Nüshu should be taught as part of formal education, especially in secondary and university education. They claimed that getting students involved early is essential to keeping the script alive. This made some wonder that if Nüshu was taught in schools, perhaps not only could young people appreciate it as a unique piece of history, but might even find ways to help keep Nüshu alive in the modern world by adapting it to a variety of mediums, such as poetry, graphic design, or feminist discourse. Some visitors even recommended that the museum work with local schools to create cultural immersion activities, or mobile exhibitions that bring Nüshu beyond the buildings of the museum.

The implications of this are twofold: First, the physical artifacts in question are preserved within the museum; however, the established communication practices surrounding the script fail to both accurately portray the writing system and resonate with modern audiences. Such an interpretive model, digitally augmented, is what many mainstream audiences as well as scholars themselves seem to want and need—a reimaged product that meets expectations of engagement without diluting the cultural substance.

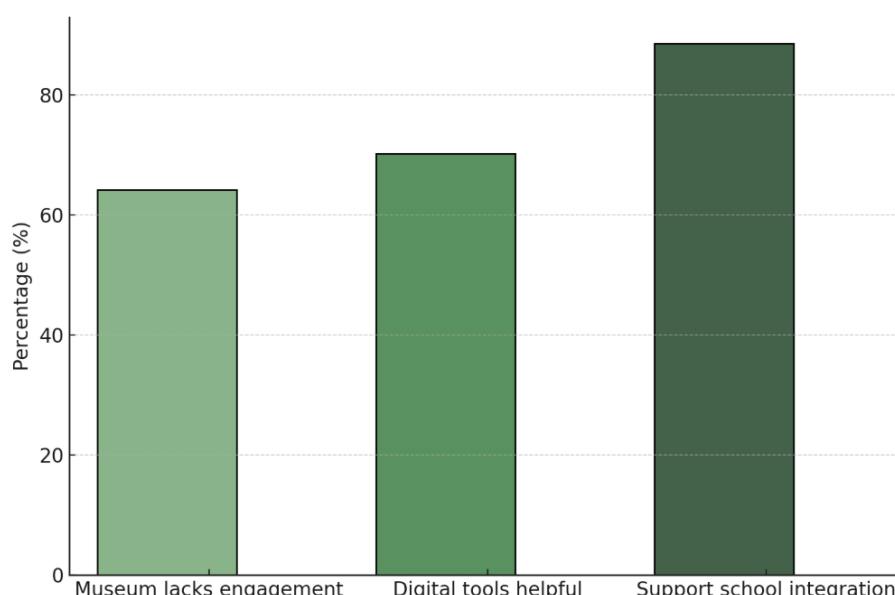


Figure 4. Museum Visitors' Perception on Nüshu Promotion

4.4. Performance of Digital Platforms

Results quickly followed, with the Yunshang Nüshu digital campaign tracked over a six-month period across both Xiaohongshu and an independent website performing well. Here's a summary of our engagement metrics.

Table 1. Digital Platform Performance Data

Metric	Value
Xiaohongshu Followers	2,478
Total Likes (All Posts)	13,592
Most Viewed Video (Views)	213
Average Engagement Rate (%)	7.2
Unique Website Visitors	9,112
Average Session Duration (min)	4.58
Website Bounce Rate (%)	21.8

The "Interactive Writing Tool" was the website's most visited feature with over 32.7% of total sessions. Users could type Chinese pinyin, and then the tool would change those words into artistic Nüshu characters.

4.5. Users Review and Iterative Changes

Some of the user feedback collected over multiple channels—including Xiaohongshu comment sections, voluntary in-site surveys on Yunshang Nüshu, and direct email submissions—has been instrumental in the continuity of refining the platform and future iterations. The responses were indicative of user enthusiasm, and provided a set of actionable suggestions that guided a responsive development process based on both usability and respect for culture.

In fact, a huge 73% of respondents characterized the interactive writing tool as enjoyable and intuitive, referring to its visual clarity, and the immediate, concrete pleasure of seeing familiar Chinese pinyin morph into Nüshu characters. Users compared the experience to, “an elegant puzzle,” and expressed the tool made an unfamiliar script feel natural and customized to them. Especially with younger users who have less familiarity with cultural heritage content, this feedback confirmed the appropriateness of gamified engagement strategies.

Just as impressive was the level of interest expressed by 61% of users, who said they wanted downloadable font packages. People reached out to get high-res stylized sets of Nüshu characters that could be used in personal contexts, such as academic projects, digital art, and culturally-themed design work (e.g. invitations, apparel, and tattoo mockups). The team also received many inquiries from university professors seeking educational licenses to use the fonts in classes, such as introductory cultural linguistics or visual communication.

Yet, as user adoption grew, so did the scrutiny over visual and historical accuracy. A few power users and legacy lovers voiced worries that some of the character renderings within the digital typeface did not match established academic glyph shapes or overly "modernized" their shapes. The seriousness of these issues led the team to begin consulting Nüshu scholars, including those in Zhao Liming's circle of research. This collaboration also resulted in 30 characters being modified to better match the Nüshu Standard Glyph Set whilst remaining legible digitally.

It is the allusion to the possibility of a feedback loop between user-centered design and culture. Instead of viewing end-users as passive consumers of heritage content, our platform imagined them as co-designers—individual patrons who could influence the proper shape, function, and future of Nüshu in a digital realm. Not only did this participatory model increase platform retention and organic promotion, but it also served as a positive reference for future ICH digitization projects, where we can balance cultural preservation with modern interaction design, rather than seeing them as mutually exclusive and antagonistic goals.

5. Discussion

This study shows the paradoxical position of Nüshu, a writing system with significant historical and cultural implications; inextricably tied to the lives of the women of the imperial China it is so tied to, and yet so marginal to contemporary audiences —on whom it is a misunderstood and largely invisible writing system. Arguably, this paradox best captures a larger dilemma in intangible cultural heritage (ICH) preservation, which is how to be true to the heart and soul of tradition whilst still being relevant and attractive to modern digital learners. We demonstrate that, if designed and implemented with cultural sensitivity, digital tools can be potent tools for preserving and revitalizing endangered traditions like Nüshu—both digitally and in the public space.

Consistent with a burgeoning, interdisciplinary literature that identifies the potential of new media for the revitalization of intangible cultural heritage (ICH) 10, our findings demonstrate that new media can continue to play an important role in this context. Instead of being simply knowledge hubs, digital minds have evolved into cultural ecosystems—the contexts on-line that allow for learning, identity exploration, and creative outlet.

This potential is exemplified by the success of the Yunshang Nüshu platform, by traffic, engagement rate, and qualitative user feedback. Digital media also bypass traditional practices of preservation—through static museum presentations, archival storage, or monographic study—by facilitating access at decreased levels and through many different forms of interaction. Nüshu is not only something a user can read about but also hear sung, see writ out in real time, be prompted to write themselves interactively, and share socially within minutes of experiencing it online.

Specifically, the plan and quiz modules that we used as interactive tools, such as writing simulator were a game changer. Analytics revealed that these features were responsible for more than 50% of user retention with average session-lengths of over four minutes per user—which is a high figure for cultural sites. Scribes called the writing tool "surprisingly addictive," "meditative to the eyes," and "a poetic way to connect with something primordial." Such responses strongly reflect participatory heritage theory, which posits that in the digital age, cultural heritage should be co-created, rather than consumptive [12].

In addition, by their very modular and responding characteristics, digital tools enable customized learning paths. A casual user might just want to see what Nüshu looks like, while a more committed learner might explore etymological roots, historical contexts, or compare scripts across regional variants. Such kind of pedagogical agility is not possible for most physical exhibits or printed formats, and mirrors the distinctive affordances of digital heritage environments.

On the flip side, we should always keep in mind that digital revival should never be understood as cultural degradation. To this end, cultural scholars oversaw all interactive modules on our platform to ensure that such engagement does not happen at the expense of either historical complexity or cultural dignity. From this perspective, digital media are not just vehicles for content—they are curatorial spaces that mediate between interactivity and integrity.

Thus, in a nutshell, the case of Nüshu was a perfect representation of how well thought out digital media projects can create a middle ground between invisibility and presence of a footprint, on the long run, traditional cultures that are vulnerable thus valuable and too precious to just be suffering to retain a status quo in the 21st century, while they are being provided with visibility, but not viability.

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