



The Influence of Digital Display Methods on User Interaction Experience: A Case Study of Stone Carvings in Southern Dynasties Mausoleums

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Abstract

This study addresses the growing challenge of optimizing user interaction experiences in the digital dissemination of cultural heritage, particularly in the presentation of stone carvings from Southern Dynasties mausoleums. Despite the increasing use of digital media, conventional text-and-image displays often fail to fully engage users and convey the richness of historical artifacts. Therefore, this study aims to examine the influence of different digital display methods on user interaction experience and to identify more effective strategies for enhancing audience engagement. A quantitative research design was employed by developing two types of digital display materials: conventional text-and-image displays and enhanced interactive displays. Data were collected via questionnaire surveys distributed to 110 participants, yielding 101 valid responses. Participants were divided into two groups: Group A (51 participants) experienced the conventional display, while Group B (50 participants) interacted with the enhanced display. The study measured five key dimensions: clarity, engagement, satisfaction, willingness to continue browsing, and sharing intention. Data analysis included descriptive statistics, independent sample t-tests, correlation analysis, and regression analysis. The findings reveal that the enhanced interactive display significantly outperformed the conventional display across all five dimensions. Furthermore, interaction experience demonstrated a strong positive predictive effect on both willingness to continue browsing and sharing intention. These results imply that effective digital dissemination of cultural heritage should prioritize information layering, detailed visualization, and interactive guidance. This study contributes practical insights for designing engaging digital heritage displays and offers a valuable reference for future research on cultural heritage digitalization.

Keywords: *Digital display, Digital Dissemination, Interaction Experience, Stone Carvings in Southern Dynasties Mausoleums*

A. Introduction

The stone carvings in Southern Dynasties mausoleums are representative examples of ancient Chinese mausoleum art, including stone beasts, stone pillars, and stone tablets (Figure 1). Stone carvings not only reflect unique styles and aesthetic tastes but also carry the religious beliefs, ritual traditions, and symbolic significance of the Southern Dynasties period. The stone carvings in Southern Dynasties mausoleums have artistic, historical, and spatial significance and are important material evidence for the study of ancient Chinese sculpture and mausoleum systems.

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(Source: Photo by author, 2025)

Figure 1. The stone carvings in the Southern Dynasties mausoleums

In recent years, digital technology has been widely applied to the preservation and dissemination of cultural heritage, and its presentation has shifted towards a multimodal, interactive, and immersive direction (Li et al., 2024; Zhang, 2024). For heritage objects such as stone carvings in Southern Dynasties mausoleums, which are scattered and have a high threshold for on-site visits, digital display provides a new pathway for their dissemination. On the one hand, digital media has expanded the channels for the public to access cultural heritage; on the other hand, the digital display methods themselves profoundly affect users' reception, understanding, and engagement in heritage information (Chen et al., 2021).

However, the popularization of digital dissemination does not necessarily lead to a deeper understanding (Rahaman, 2018). For the stone carvings in Southern Dynasties mausoleums, general users often lack a historical background and have a limited understanding of their spatial locations, symbolic meanings, and cultural contexts. If the digital display only presents static images and brief text, although users can view the heritage, they cannot form an effective understanding or sustained interest (Rahaman & Tan, 2011; Wang & Meng, 2024). Therefore, the digital display method is an important variable that affects user interaction experience and dissemination effectiveness.

The current research on the stone carvings in Southern Dynasties mausoleums focuses on artistic style, digital preservation, and display applications (Guo & Zeng, 2024; Yang, 2024; Ma, 2024). There are few studies that quantitatively examine the relationship between digital display methods and interaction experiences from a user perspective. Based on the above background, this study focuses on stone carvings in Southern Dynasties mausoleums, compares the effects of two digital display methods, conventional text-and-image display and enhanced interactive display, on user interaction experience, and further analyzes the relationship between interaction experience and willingness to continue browsing and sharing intention. This study aims to answer four questions: Firstly, do different digital display methods significantly affect user interaction experience? Secondly, is an enhanced interactive display superior to regular graphic and textual displays in terms of clarity, engagement, and satisfaction? Thirdly, does a positive interaction experience further enhance users' willingness to continue browsing? Fourthly, does a positive interaction experience further enhance users' sharing intention?

B. Methods

Research Design

This study adopts a quantitative approach to compare the effects of two different types of digital display materials on user interaction experience. The study adopted a between-group design, in which participants were assigned to two display conditions: conventional text-and-image materials and enhanced interactive materials. After viewing the materials, participants complete a structured questionnaire to evaluate their interaction experience and related behavioral intentions during browsing.

Participants

The participants in this study are college students with some experience using digital media, who can navigate digital displays and complete questionnaires. The sample professional background covers students in humanities, science and engineering, and arts, to maximize the diversity of the sample and reflect, to some extent, the differences in the experience of users with different knowledge backgrounds in the digital display of cultural heritage. A total of 110 questionnaires were distributed, and 104 were collected; 101 were valid. In the valid sample, there were 47 males and 54 females. After grouping by display condition, Group A's conventional text-and-image display group has 51 participants, while Group B's enhanced interactive display group has 50 participants.

Design of Display Materials

This study focuses on designing two types of materials for the digital display of stone carvings in Southern Dynasties mausoleums: conventional text-and-image displays and enhanced interactive displays. The core objects presented by the two sets of materials are consistent, both showcasing stone carvings in Southern Dynasties mausoleums, and include three representative elements: stone beasts, stone pillars, and stone tablets, thereby ensuring the comparability of the experimental materials at the content level. The difference between the two types of materials mainly lies in how information is organized and in the form of interaction.

Group A adopts the conventional text-and-image display method, including pictures, names, dates, and brief introductions of the stone carvings in Southern Dynasties mausoleums. This group of materials is presented on static pages, and users primarily access information through linear reading, without interactive features such as zooming and layered unfolding. This display method is similar to the common text-and-image introductions in daily online dissemination and can reflect the characteristics of basic digital dissemination.

Group B adopts an enhanced interactive display method, using the same display objects as Group A but adding richer digital expression and interactive design to conventional text-and-image content. Specifically, it includes 3D modeling of stone carvings, layered information modules, partial displays of details, diagrams showing spatial relationships, and explanations of symbolic meanings. Users can obtain information through zooming, modular browsing, and hierarchical unfolding, thereby forming a more proactive, continuous browsing process. This display method emphasizes the hierarchy of information organization, guidance for content understanding, and user engagement.

Questionnaire Implementation Process

The questionnaire survey of this study adopts a combination of online and offline methods. Before filling out the questionnaire, participants need to watch the corresponding presentation materials, then complete the questionnaire after finishing the viewing. To ensure the integrity of the participant experience, each participant should watch the presentation materials for

approximately 3 minutes. To reduce participants' concerns, the questionnaire is completed anonymously, thereby improving the authenticity and reliability of the responses.

Variables and Measurement

This study used a five-point Likert scale, with participants choosing a number from 1 to 5, where 1 indicated "strongly disagree" and 5 indicated "strongly agree" (Likert, 1932). The survey questionnaire consists of 12 multiple-choice questions, covering five dimensions: clarity, engagement, satisfaction, willingness to continue browsing, and sharing intention. Clarity includes three multiple-choice questions: the displayed information is very clear, I can quickly understand the key points, and the presentation style is helpful for my understanding. The sense of engagement includes three multiple-choice questions: willingness to continue learning and exploring, the presentation style that enhances engagement, and the ability to focus on showcasing content. Satisfaction includes two multiple-choice questions: satisfied with the presentation method; hope to use a similar method again to browse related content. The willingness to continue browsing includes two multiple-choice questions: willingness to continue learning about the stone carvings in Southern Dynasties mausoleums; willing to watch other related content. The sharing intention includes two multiple-choice questions: willing to share the stone carvings in Southern Dynasties mausoleums with friends; willing to recommend this display method to my friends.

This study used SPSS to analyze the data, including descriptive statistics, reliability analyses, independent-samples t-tests, Pearson correlation analyses, and linear regression analyses. Descriptive statistics are used to present the mean and standard deviation of each variable; Reliability analysis is used to test the consistency of the scale; The t-test is used to compare the differences between two sets of data on each variable; Correlation analysis is used to examine the relationships between variables; Regression analysis is used to test the predictive effect of interaction experience design on the willingness to continue browsing and sharing intention.

C. Results and Discussion

Reliability Analysis

The questionnaire shows that the Cronbach's alpha coefficients for all dimensions exceed 0.80, indicating good reliability and meeting the requirements of subsequent statistical analysis (Tavakol & Dennick, 2011). Specifically, the alpha of the clarity dimension is 0.873, the sense of engagement is 0.927, the satisfaction is 0.820, the willingness to continue browsing is 0.932, and the sharing intention is 0.906. In summary, the measurement tools used in this study have good reliability and credibility, and are suitable for subsequent analysis.

Descriptive Statistics

Table 1 shows the mean and standard deviation of each variable under different display methods. Overall, Group B's enhanced interactive display group scored significantly higher than Group A's conventional text-and-image display group in all five dimensions. Especially in terms of engagement, willingness to continue browsing, and sharing intention, the gap between Group B and Group A is more pronounced. This indicates that incorporating layered information, detailed presentation, and interactive design into the presentation can help stimulate participants' active exploration and make it easier for them to continue paying attention and sharing.

Table 1. Descriptive statistics of the variables by display methods

| variable | Group A(n=51)M±SD | Group B(n=50)M±SD |
|----------------------------------|-------------------|-------------------|
| Clarity | 2.92 ± 0.54 | 3.95 ± 0.54 |
| Engagement | 2.76 ± 0.67 | 4.17 ± 0.62 |
| Satisfaction | 3.00 ± 0.48 | 4.08 ± 0.64 |
| Willingness to continue browsing | 2.76 ± 0.56 | 4.21 ± 0.79 |
| Sharing intention | 2.37 ± 0.70 | 3.81 ± 0.74 |

Independent-samples T-tests

To test whether different digital display methods significantly affect the user interaction experience, this study conducted independent-samples t-tests on two groups and reported the results in Table 2.

Table 2. T-test results of differences in variables under different display methods

| Variable | t | df | p | Cohen's d |
|----------------------------------|--------|-------|--------|-----------|
| Clarity | -9.66 | 98.97 | <0.001 | 1.92 |
| Engagement | -10.87 | 98.63 | <0.001 | 2.16 |
| Satisfaction | -9.57 | 90.70 | <0.001 | 1.91 |
| Willingness to continue browsing | -10.59 | 88.22 | <0.001 | 2.12 |
| Sharing intention | -10.02 | 98.38 | <0.001 | 2.00 |

The results showed that Group B was significantly higher than Group A on clarity, engagement, satisfaction, willingness to continue browsing, and sharing intention, and the effect sizes were larger. This indicates that digital display methods have significant effects on user experience and subsequent behavioral intentions, thereby supporting H1. Meanwhile, an enhanced interactive display is significantly better than a conventional text-and-image display in terms of clarity, engagement, and satisfaction, thereby supporting H2.

From the results, the between-group differences in engagement and willingness to continue browsing were the most pronounced, indicating that interaction design plays a strong role in stimulating users' continuous exploration and deepening engagement. The stone carvings in Southern Dynasties mausoleums have a high threshold for understanding, and relying solely on static text-and-image is difficult to sustain participants' interest. However, interactive enhancement design can motivate participants to actively explore and share.

Correlation Analysis

This study conducted a Pearson correlation analysis of various variables to further examine the relationship between interaction experience and behavioral intention. The results indicate a significant positive correlation among clarity, engagement, satisfaction, and the intention to continue browsing and sharing, with a high overall correlation.

Among them, the correlation coefficient between engagement and willingness to continue browsing is the highest ($r=0.925$), indicating that when users experience greater interactivity and engagement during browsing, they are more likely to continue learning about the relevant content of stone carvings in Southern Dynasties mausoleums. There is also a significant positive correlation between satisfaction and willingness to continue browsing ($r=0.904$), and a strong correlation between clarity and sharing intention ($r=0.872$). These results indicate that the interaction experience is not just an immediate feeling during browsing, but also further affects users' subsequent contact and sharing behavior.

Regression Analysis

To test the predictive effect of interaction experience on behavioral intention, this paper further constructed a linear regression model with the mean of clarity, engagement, and satisfaction synthesized as the "total average of interaction experience".

The results showed that the overall interaction experience score had a significant positive predictive effect on the willingness to continue browsing ($\beta=1.175$, $p<0.001$), and the model had a high explanatory power ($R^2=0.882$). Meanwhile, the overall average score of interaction experience also has a significant positive predictive effect on sharing intention ($\beta=1.154$, $p<0.001$), with a model explanatory power of $R^2=0.813$. From this, it can be seen that a positive interaction experience can not only enhance users' evaluation of the current display but also significantly increase their willingness to further browse and spread, thereby supporting H3 and H4.

The results of this study indicate that different digital display methods have a significant effect on the user interaction experience of stone carvings in Southern Dynasties mausoleums. An enhanced interactive display is significantly better than a conventional text-and-image display in terms of clarity, engagement, and satisfaction, indicating that the display method directly affects users' understanding of cultural heritage and their willingness to continue paying attention.

Firstly, from the perspective of clarity, an enhanced interactive display can enhance user focus through interactive design, promoting easier understanding of key points in the content (Fontal et al., 2025). The stone carvings in the Southern Dynasties mausoleums carry profound cultural significance. Although conventional text-and-image displays can convey basic information, it is difficult to fully convey the connotations behind stone carvings. An enhanced interactive display can enable users to understand stone carvings from multiple perspectives through detailed presentation, location indication, and hierarchical browsing.

Secondly, from the perspectives of engagement and satisfaction, the role of interaction design in the digital dissemination of cultural heritage extends beyond the technical level to user cognition and behavior. The design of clicking, zooming, and modular browsing transforms users from passive recipients of information to active explorers. This engagement mechanism enhances users' sense of engagement and control during browsing and also improves their overall satisfaction with the display method (Rizvic et al., 2024).

In addition, from the perspective of behavioral intention, a good interaction experience can significantly enhance users' willingness to continue browsing and sharing intention (Berta et al., 2025). The purpose of digitizing heritage is to encourage users to stay, understand, continue to interact with, and share it with others through reasonable display methods. For heritage objects such as the stone carvings in Southern Dynasties mausoleums with high cultural interpretation needs, an enhanced interactive display can, to some extent, lower the threshold of understanding and enhance the quality of connection between users and heritage.

In summary, this study suggests that digital display of cultural heritage should emphasize the organizational logic of user experience (Mudička & Kapica, 2022). The digital display method not only affects how users see the heritage, but also whether they are willing to enter it, understand it, and continue to spread it.

D. Conclusion

This study focuses on stone carvings in Southern Dynasties mausoleums and adopts quantitative research methods to examine the effects of two digital display methods, namely conventional text-and-image display and enhanced interactive display, on user interaction experience. The results show that an enhanced interactive display is significantly better than a conventional text-and-image display in terms of clarity, engagement, satisfaction, willingness to continue browsing, and sharing intention, indicating that digital display methods examine the effects on user experience and dissemination effectiveness.

Further analysis revealed a significant positive correlation between interaction experience and willingness to continue browsing and to share, and that interaction experience had a significant predictive effect on both types of behavioral intentions. This means that the digital dissemination of cultural heritage is not only about content but is also closely tied to content organization, guiding design, and the interaction experience. For cultural heritage sites such as the stone carvings in Southern Dynasties mausoleums, which require a high threshold of understanding, an enhanced interactive display can improve users' experience and sustained attention.

This study still has several limitations. Firstly, selecting college students as the sample made the participant group relatively homogeneous; future research can enrich the composition of participants. Secondly, there are some differences between the two display materials selected in this study and museum digital exhibition settings or related digital product displays. Future research can further test the applicability of this study's conclusions by using more diverse presentation methods and a wider range of participants.

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