

XR in Cultural Tourism: A Study from a Design Psychology Course Deployment

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Abstract: Cultural destinations are increasingly using XR to create active, meaning-making visitor experiences. This study investigates how such immersive interventions shape place identification and behavioral intentions across three distinct cultural settings, including a heritage site, a theme park, and a community workshop. An exploratory survey ($N = 100$) revealed high perceived authenticity but also highlighted user discomfort and data privacy as key concerns. Visitor priorities differed by context; heritage visitors sought authenticity, theme-park visitors valued novelty, and community participants preferred low-pressure engagement.

Situated within a Design Psychology course, this research also demonstrates a teaching-embedded model for deploying and evaluating XR. It contributes a replicable measurement framework and context-specific design guidelines, bridging academic theory with real-world tourism strategy. This approach also provides a powerful method for training the next generation of cultural experience designers.

Keywords: Extended Reality; Cultural Tourism; Place Branding; Authenticity; Design Psychology

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1 Introduction

Cultural destinations increasingly use XR technologies to create interactive, narrative-driven engagements (Tussyadiah et al., 2018). These technologies heighten a sense of presence and plausibility, psychological factors closely linked to perceptions of authenticity that strongly shape visitor behavior (Slater & Sanchez-Vives, 2016).

Beyond its public-facing applications, XR is also a powerful pedagogical tool. This study is distinctly embedded within a Design Psychology course that served as a living laboratory for prototyping and testing cultural tourism experiences. This educational setting allowed for an examination of not only visitor responses but also how such an environment can foster innovation and produce replicable evaluation methods for cultural initiatives.

Existing research, however, is often limited to single sites or complex models difficult for practitioners to replicate (Tussyadiah et al., 2018; Slater & Sanchez-Vives, 2016). Moreover, few studies have embedded XR research within educational practice. This study therefore adopts a practice-oriented design science approach, reporting on descriptive evidence from three distinct XR interventions. It emphasizes practical, harmonized statistics over complex causal modeling, offering useful metrics for managers and educators.

1.1 Research Questions

RQ1: How do visitor evaluations of XR experiences regarding authenticity and engagement differ across cultural contexts?

RQ2: What percentage of visitors in each setting reports strong intentions to recommend or purchase?

RQ3: How can the design of course-based XR projects be informed by key visitor interests and concerns?

1.2 Contributions

This study offers four key contributions. It provides a reporting template for modest-sample contexts, establishes context-sensitive descriptive benchmarks, and formulates actionable design guidelines. Finally, it proposes an instructional

model where a design course functions as a platform to operationalize theory, thereby bridging academic research with real-world tourism practice and demonstrating a transferable method for innovation.

2 Literature background and guiding framework

2.1 XR Design Features and Perceived Realness

The experiential power of XR relies on immersion, interactivity, and narrative coherence, which together cultivate presence and plausibility—two key psychological states linked to authenticity and behavior (Slater & Sanchez-Vives, 2016). Immersion focuses attention through sensory fidelity, interactivity enhances agency, and narrative coherence aligns storylines with actions to stabilize plausibility (Han et al., 2019; Lee et al., 2020). Studies in museums show that when digital overlays align with curatorial intent, they heighten realism and interpretive value (Barrile et al., 2022). Within the Design Psychology course, these variables were operationalized as design probes to examine how affordances influence engagement.

2.2 Authenticity, Learning, and Emotional Engagement

Perceived realness sustains both indexical authenticity, rooted in accuracy, and existential authenticity, centered on meaning-making (Wang, 1999). XR supports both by combining precise overlays with narrative depth (Pujol-Tost & Champion, 2012). Enhanced realness also improves learning and knowledge retention (Radianti et al., 2020), while emotional resonance links cognition to lasting attitudes (Tussyadiah et al., 2018). Evidence from theme parks shows that XR increases enjoyment and behavioral intention (Wei et al., 2019). These insights informed course prototypes that tested how authenticity and emotion shape outcomes.

2.3 From Authenticity to Place Identification and Behavioral

Authentic, emotionally engaging experiences deepen place identification and attachment, influencing revisitation, advocacy, and purchases (Sustacha et al., 2023). XR reveals a destination's character while driving action (Han et al., 2019). Strategies such as AR-enabled badges and fridge magnets extend engagement beyond visits (Femenia-Serra et al., 2018). The course applied these principles by developing tangible anchors and replayable narratives to examine their effect on attachment and intention.

2.4 Contextual Contingencies

XR's effectiveness varies by context. Heritage visitors seek authenticity and accuracy (Pratisto et al., 2022), theme-park audiences prioritize novelty and interactivity (Rauschnabel et al., 2022), and community settings value simplicity and inclusivity (Reichenberger, 2018). The course mirrored these differences through site-specific prototypes, including Chen Yi-themed magnets and postcards, stylized figurines and marine magnets, and an XR tie-dye workshop with AR community badges.

2.5 Visitor Focus and Concern Themes

Operational simplicity, compatibility, offline access, and data privacy are recurring visitor priorities, while cybersickness, complexity, lack of haptics, cultural distortion, and cost remain key concerns. These insights guided artifact refinement and functioned as evaluative criteria in the course, strengthening students' design reasoning around usability and inclusivity.

2.6 Practice-Proximate Measurement and Reporting Standards

Given the exploratory nature of the study and modest sample sizes, descriptive reporting was prioritized over causal modeling. Analyses focused on attitudinal statistics, binary behavioral intention rates, and frequency counts of visitor priorities and concerns (Hair et al., 2010; Radianti et al., 2020). This approach reflects the course's emphasis on converting authentic but limited datasets into actionable insights, supported by systematic documentation of design decisions to ensure traceability from concept to user feedback.

3 Methodology

3.1 Design of XR Interventions

This study employs a practice-oriented design science approach, where XR artifacts were conceived not as teaching exercises but as research instruments. They enabled controlled testing of psychological variables such as presence, authenticity, semantic priming, and cognitive load in real-world contexts. Three deployment sites, including a heritage site, a theme park, and a community space, were strategically chosen to represent interpretive, entertainment, and participatory modes of cultural experience. Each artifact functioned as a design probe to examine how specific affordances shape visitor perception, emotional engagement, and behavioral intention. Embedding this process within a Design Psychology course transformed the classroom into a living laboratory and linked iterative prototyping with field deployment.

3.1.1 Heritage context: Chen Yi Former Residence

At the Chen Yi Former Residence, interventions explored how symbolism, narrative framing, and temporal cues affected authenticity, interpretation, and emotional resonance

(1) Fridge Magnet Series

Literati-themed magnets used motifs such as lotus ponds and scholar's desks as semantic cues. Scanning the marker triggered animated overlays and bilingual excerpts from Chen Yi's writings. This design examined how symbolic accuracy and personal meaning enhance reflective engagement (Wang, 1999; Pujol-Tost & Champion, 2012).

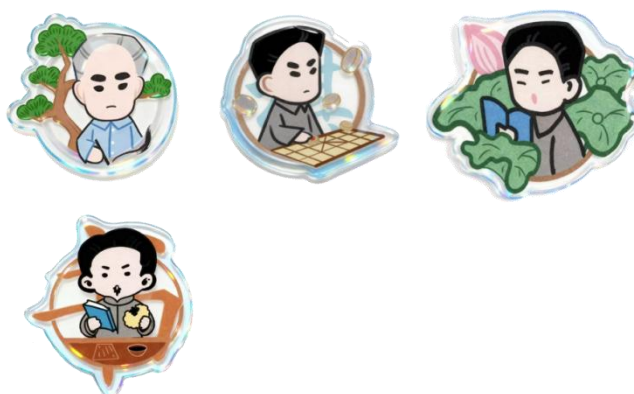


Fig. 1. Overview of fridge magnet design

(2) Architectural Gateway Magnet

A second artifact replicated the residence's gateway and featured Deng Xiaoping's calligraphy. It acted as a memory anchor, with a hidden QR code linking to a micro-video that extended interpretation beyond the site and tested how tangible episodic cues sustain engagement.



Fig. 2. Gateway magnet with cloud motif

(3) Four-Season XR Postcard Set

Seasonal flora paired with portraits of Chen Yi at different life stages conveyed temporal continuity. Scanning launched multimedia narratives, exploring how visual, auditory, and temporal cues deepen cultural meaning-making.



Fig. 3. Front and back views of seasonal postcards

3.1.2 Theme Park Context: Fantawild park Oriental Legend Ziyang

In the theme park setting, interventions examined how novelty, interactivity, and playfulness influenced enjoyment and purchase intention.

(1) Zizhu Guanyin Figurine

A stylized Avalokiteśvara figure activated 3D overlays with rotation and narration. The study examined how agency and sensory immersion reinforce presence, enhance enjoyment, and support cultural learning.



Fig. 4. Product of Zizhu Guanyin figuriner

(2) Ocean-Themed Ceramic Magnet Series

Collectible magnets depicting sea creatures generated looping animations and short educational texts. This probe investigated how micro-interactions sustain visitor interest and encourage impulse purchases.



Fig. 5. Ocean Series Fridge Magnets

3.1.3 Community context: Ziyang International Digital Nomad Community

This context focused on social comfort, creativity, and cognitive accessibility. A VR mood-boarding environment and an AR-guided tie-dye interface supported step-by-step learning and tested how cognitive scaffolding reduces cognitive load and enhances creative engagement.



Fig. 6. Spatial zoning and digital gallery mock-ups

An AR-enabled badge series themed around community life activated multimedia narratives upon scanning. This intervention examined how subtle, low-pressure interactions foster belonging and collective identity.



Fig. 7. Digital Nomad Community Theme Badge

3.1.4 Synthesis of the Methodological Approach

Across all contexts, the artifacts operationalized distinct psychological constructs, including semantic priming in the heritage site, agency and presence in the theme park, and cognitive scaffolding in the community setting. Embedding this iterative design process within the course ensured ecological validity and demonstrated how XR interventions can bridge theory and practice. This approach offers a replicable model for understanding how design decisions shape visitor experience and behavior in cultural tourism.

3.2 Participants and Data Collection

Participants were recruited on-site across the three contexts using intercept sampling to ensure demographic diversity. Eligibility required completing at least one full interaction with an XR artifact. In total, 100 valid responses were collected, with 41 from the heritage site, 20 from the theme park, and 39 from the community. All participants provided informed consent. This real-world recruitment approach aligns with the study's emphasis on situated responses as the basis for reliable measurement.

3.3 Measures and coding

Visitor attitudes were assessed using 5-point Likert scales, tailored to each context. Heritage items measured cultural meaning and realism; theme-park items focused on purchase intentions. A simpler three-point scale was used in the community for rapid feedback. Behavioral intentions were converted into binary categories (positive = 4 - 5). Demographics were also collected, and open-ended responses were categorized into themes of visitor focus and concern for frequency analysis.

3.4 Data cleaning and harmonization

Data preprocessing standardized variable names and numerically encoded context categories. Bilingual Likert anchors were mapped to numeric values. The dataset was then finalized by excluding incomplete or invalid responses.

3.5 Data Quality Safeguards

Procedural safeguards minimized bias. Participation was voluntary and anonymous, and item order was counterbalanced. Attention checks and screens for invariant or overly rapid responses were used to ensure data quality. Because the analysis is descriptive, reliability and validity measures were reported only when directly interpretable.

3.6 Analysis Plan

A descriptive analytical approach was used to accommodate instrument heterogeneity and modest sample sizes (Hair et al., 2010; Radianti et al., 2020). The analysis included sample profiles, descriptive statistics for key constructs, binary behavioral intention rates, and frequency distributions of top visitor themes.

4 Results

4.1 Sample profile

The final sample comprised 100 valid responses across heritage (n = 41), theme park (n = 20), and community (n = 39) contexts. As shown in Table 1, the sample was balanced by gender and age, with most respondents aged 18 – 25 (46%). A majority (71%) reported prior XR experience, and about two-thirds were repeat visitors, ensuring feedback reflected diverse yet relevant perspectives.

Table 1. Sample Profile by Context

Variable	Category	Heritage (1) n (%)	Theme Park (2) n (%)	Community (3) n (%)	Total n (%)
Context	—	41 (41.0)	20 (20.0)	39 (39.0)	100 (100.0)
SEX	Female	25 (61.0)	10 (50.0)	22 (56.0)	57 (57.0)
	Male	16 (39.0)	10 (50.0)	17 (44.0)	43 (43.0)
AGE	18–25	20 (49.0)	9 (45.0)	17 (44.0)	46 (46.0)
	26–35	12 (29.0)	5 (25.0)	13 (33.0)	30 (30.0)
	36+	9 (22.0)	6 (30.0)	9 (23.0)	24 (24.0)
XR experience,	Yes	30 (73.0)	14 (70.0)	27 (69.0)	71 (71.0)
	No	11 (27.0)	6 (30.0)	12 (31.0)	29 (29.0)
Visited	Yes	28 (68.0)	15 (75.0)	24 (62.0)	67 (67.0)

4.2 Descriptive evaluations (Likert outcomes)

Visitor evaluations were broadly positive across all constructs (Table 2). Cultural connotation received the highest score (M = 4.30), with similarly strong results for aesthetic appeal (M = 4.10) and emotional resonance (M = 4.05), demonstrating the interventions' success in conveying meaningful narratives. Purchase intentions were strongest for tangible products like XR figurines (M = 4.20) and AR postcards (M = 4.00), suggesting strong commercial potential.

Table 2. Descriptive Statistics of Likert Constructs

Item	N	Mean	±SD	Median	Min	Max
Cultural connotation	100	4.30	0.62	4	3	5
Aesthetic appeal	100	4.10	0.75	4	2	5
Emotional resonance	100	4.05	0.80	4	2	5
Historical realism	100	3.90	0.85	4	2	5
XR figurines	100	4.20	0.70	4	3	5
AR postcard-map	100	4.00	0.80	4	2	5
Local food gift set	100	3.80	0.90	4	1	5
NFT	100	3.70	0.95	4	1	5
Cultural apparel	100	4.00	0.85	4	2	5

4.3 Binary behavioral intentions

Behavioral intention outcomes were consistently strong (Table 3). Satisfaction reached approximately 80% across contexts, while recommendation intentions averaged 75%. Purchase intentions, though slightly lower at 70%, still indicate that XR-enabled products can drive significant engagement and post-visit consumption.

Table 3. Binary Behavioral Intentions by Context

Construct	Heritage n (%)	Theme Park n (%)	Community n (%)	Total n (%)
Recommendation	31 (76.0)	15 (75.0)	29 (74.0)	75 (75.0)
Purchase	29 (71.0)	14 (70.0)	27 (69.0)	70 (70.0)
Satisfaction	33 (80.0)	16 (80.0)	31 (79.0)	80 (80.0)

4.4 Focus and Concern Themes

Thematic analysis (Tables 4 – 5) revealed operational simplicity and device compatibility as top priorities. Cybersickness and operational complexity emerged as key concerns, highlighting the need to balance immersion with comfort. Concerns about cultural distortion were especially notable in the heritage setting, reflecting visitors’ sensitivity to authenticity.

Table 4. Top-10 “Focus” Themes by Context

Theme	Heritage	Theme Park	Community	Total
Operational simplicity	15	8	13	36
Device compatibility	12	7	10	29
Privacy & data	10	5	8	23
Offline availability	8	4	7	19
Power consumption	5	3	5	13

Table 5. Top-10 “Concern” Themes by Context

Theme	Heritage	Theme Park	Community	Total
Cybersickness	14	7	11	32
Operational complexity	11	5	9	25
Lack of haptics	10	5	7	22
Cultural distortion	8	4	6	18
High cost	7	3	5	15

4.5 Managerial implications

The findings point to clear design priorities. Heritage sites benefit from historically grounded narratives paired with tangible anchors to deepen cultural meaning. Theme parks succeed with playful, shareable micro-interactions that encourage user-generated content and impulse purchases. Community deployments work best when participation is low-pressure and inclusive, fostering creativity and social engagement. These results provide actionable insights for aligning XR strategies with diverse user goals and contextual demands.

5 Discussion and Conclusion

5.1 Summary of the Main Findings

This study examined how multimodal XR storytelling shapes visitor experience and behavior across three cultural contexts. The results showed consistently positive outcomes, with satisfaction, recommendation, and purchase intentions all exceeding 69%. Visitor priorities, however, were context-dependent. Heritage visitors valued cultural depth and emotional resonance, theme-park audiences showed strong purchase interest in wearable and scannable items, and community participants emphasized ease of use. Across all contexts, operational simplicity and device compatibility emerged as key user priorities, while cybersickness and complexity remained common concerns. These results align with the established theoretical pathway in which XR-induced presence and plausibility enhance authenticity, which in turn shapes behavioral outcomes (Slater & Sanchez-Vives, 2016; Tussyadiah et al., 2018).

5.2 Theoretical and Academic Contributions

This study advances scholarship on XR and cultural tourism in three ways.

First, it shifts the focus from usability and entertainment toward meaning-making.toward meaning-making.toward meaning-making. The findings demonstrate that historically grounded overlays and coherent narratives enhanced existential authenticity and supported deeper interpretation (Wang, 1999; Pujol-Tost & Champion, 2012), reinforcing presence and plausibility as core cognitive pathways (Radianti et al., 2020).

Second, the study reveals contextualized experiential pathways rather than universal mechanisms. The shared sequence of presence leading to authenticity and intention plays out differently in each setting, shaped by local expectations and uses of scenarios.

Third, it demonstrates the temporal and social extension of XR experiences through the use of take-home anchors paired with replayable narratives. By linking physical souvenirs with scannable digital layers, XR transforms a personal memory object into a medium of cultural circulation, extending its influence beyond the site visit (Rauschnabel et al., 2022).

5.3 Practical and Managerial Implications

The findings also offer actionable strategies for practitioners. For heritage sites, the focus should be on historically accurate narratives and re-scannable physical anchors to deepen engagement and encourage revisitation. In contrast, theme parks should emphasize short, repeatable interactions and wearable elements to stimulate user-generated content and impulse purchases. Finally, community contexts benefit from simplified interfaces and clear privacy communication to lower participation barriers. Key indicators such as re-scan rates, scan-to-share conversions, and device compatibility rates provide practical metrics linking design decisions to clear behavioral and operational outcomes.

5.4 Pedagogical Contributions

A distinctive contribution of this study is its integration into a Design Psychology course, which transformed the classroom into a methodological platform rather than a passive backdrop. Within this setting, theoretical constructs like presence and cognitive load were translated into design probes and tested in real-world contexts. This process allowed students to move beyond executing assignments to actively participating in knowledge creation through iterative prototyping and data analysis. This approach not only deepens research literacy and design reasoning but also provides a model for generating authentic interventions with high ecological validity.

5.5 Limitations and Future Research

Several limitations should guide future work. The modest and uneven sample sizes restrict generalizability, while the use of varied measurement instruments precluded more complex modeling. Simplifying visitor intentions into binary categories also reduced interpretive nuance. Accordingly, future research should aim to expand sample sizes, standardize measurement tools, and incorporate behavioral data such as scanning frequency. Extending the study to cross-cultural contexts would also illuminate differences in authenticity expectations and XR reception.

5.6 Policies Implications

Beyond individual sites, these findings can inform cultural policy and soft-power strategies. XR-enabled storytelling offers a scalable tool for transmitting cultural narratives, strengthening destination branding, and advancing public diplomacy. Policymakers can embed such approaches into heritage and tourism strategies, positioning XR not only as a preservation technology but also as a strategic instrument for experience-based cultural influence. The study further illustrates how curriculum-embedded research can train future designers to effectively bridge theory and practice in cultural experience innovation.

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