An Exploratory Cross-Cultural Study of Virtual Library Tourism: User Experiences at the National Library of the Republic of Indonesia

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Notes	ABSTRACT
  	This study investigates the cross-cultural perceptions of Indonesian and Malaysian students regarding the virtual literacy tourism services offered by the National Library of the Republic of Indonesia. As part of ongoing digital transformation efforts in the literacy sector, these virtual tour services provide an alternative means of accessing information and promoting cultural heritage. The purpose of this research is to analyze perceptual differences between the two student groups using user experience theory, which encompasses cognitive, affective, and cultural dimensions. A quantitative comparative design was employed, involving a purposive sample of 100 participants, 50 students from Indonesia and 50 students from Malaysia. Data were collected through an online questionnaire using a 5-point Likert scale and analyzed through descriptive statistics and independent sample t-tests. The findings reveal that, overall, there are no significant differences between the two groups across most indicators. However, a notable distinction appears in the affective dimension, specifically the sense of presence, which is higher among Malaysian respondents. These results indicate that user experience is shaped by cultural context and highlight the potential of virtual library tours to foster cross-cultural engagement and understanding. **Keywords:** Virtual library tourism; Cross-cultural user experience; Digital literacy services

1. INTRODUCTION

The digital transformation in the GLAM sector (galleries, libraries, archives, and museums) has significantly reshaped the way people access, experience, and engage with knowledge. One of the most notable innovations to emerge from this transformation is library tourism, which

redefines libraries as interactive, experiential learning spaces, moving away from static repositories of information (Rejeki, Renggani, Agustine, et al., 2024). Through digital technologies such as virtual tours, AI-based guides, and immersive 3D environments, libraries now enable users to explore collections beyond physical boundaries (Spyrou et al., 2025).

In Indonesia, the National Library of Indonesia (Perpusnas) is among the first institutions in Southeast Asia to implement virtual cultural and literary tourism, offering services through its platform at https://virtual-tour.perpusnas.go.id/. This initiative expands public access to Indonesia's literary and cultural heritage and promotes inclusion for audiences unable to visit the library physically. It aligns with global efforts to democratize cultural knowledge and support open access (Klymenko & Sokur, 2025). However, empirical studies examining how users from different cultural backgrounds perceive these virtual literacy experiences remain limited.

Indonesia and Malaysia were selected as the comparative contexts due to their linguistic, educational, and cultural similarities, which allow for meaningful cross-country analysis. Both countries use mutually intelligible national languages, *Bahasa Indonesia*, and *Bahasa Melayu*, and share educational structures influenced by international academic standards. Nevertheless, they differ in levels of digital readiness: Malaysia's digital readiness level is 89%, while Indonesia's is 77% (Digital Progress and Trends Report 2023, 2023). These contrasts make the two countries ideal cases for examining how users from similar cultural backgrounds, but different technological contexts perceive digital literacy platforms. Furthermore, both countries are active partners in the ASEAN Digital Literacy Program (*ASEAN Digital Literacy Programme*, 2024), which promotes regional cooperation in building inclusive digital ecosystems. Preliminary analyses of the National Library's virtual platform indicate a small but growing number of visitors from Malaysia and other ASEAN countries, although no studies have yet examined how these international users perceive the service. Thus, studying the user experience in these two countries provides a representative case study in the context of ASEAN digital integration and intercultural learning.

Previous studies on innovation in digital libraries in Indonesia, such as those by Putri & Hermawan (2024), Roslina (2022), and Rejeki et al. (2024), have emphasized technical usability, interface design, and user satisfaction, highlighting the potential of digital services to improve engagement with literacy. However, these studies are largely limited to the national context and do not incorporate comparative or theoretical frameworks that take cultural variations into account. At the international level, Spyrou et al., (2025) explored immersive experiences in virtual museums and libraries, while Nejati et al., (2024) and Louie et al., (2022) examined culturally appropriate digital design. Despite their valuable insights, these studies focus primarily on Western or technologically advanced contexts, leaving a gap in understanding how users in developing regions, particularly within ASEAN, perceive digital cultural platforms from an intercultural and experiential perspective.

To address this gap, the present study adopts user experience (UX) theory as a conceptual foundation for examining user perceptions in virtual literacy environments. UX theory proposes that user interaction with digital systems involves three interrelated dimensions: cognitive, affective, and cultural (Burr et al., 2018). The cognitive dimension concerns ease of use, clarity, and navigation of information (Younas et al., 2021), while the affective dimension emphasizes emotional responses such as enjoyment and immersion (Pavic et al., 2023). The cultural dimension, meanwhile, concerns how users' values, norms, and symbolic interpretations influence their engagement with digital content (Thompson &

Brouthers, 2021). Integrating these dimensions provides a holistic understanding of how users interpret, feel, and culturally identify with the experiences offered by digital libraries.

However, few empirical studies combine UX theory with frameworks of intercultural digital engagement, particularly in non-Western contexts. Intercultural digital engagement examines how individuals from diverse cultural backgrounds interact with digital knowledge environments (Mahmood et al., 2024). In Southeast Asia, where multilingualism and cultural hybridity are prevalent, this engagement is deeply influenced by both digital competence and cultural familiarity (Li et al., 2020). While technological maturity enables access, cultural values shape how users interpret digital experiences and become emotionally attached to them.

The scarcity of studies addressing these interconnections is the main limitation of this study. Previous work often treats digital tourism in libraries as a technical innovation rather than a sociocultural experience. There is also a lack of cross-cultural empirical research comparing perceptions across ASEAN countries, despite growing regional collaboration in the field of digital education. By combining user experience (UX) theory with the perspective of intercultural engagement, this study is positioned to explore not only how users interact with a digital platform, but also how their cultural context influences their cognitive, emotional, and interpretive experiences.

Consequently, this study aims to examine how users from different cultural backgrounds perceive and experience the virtual literary tourism service of the National Library of Indonesia. It seeks to understand how cultural values, digital familiarity, and user expectations interact to shape perceptions of digital library environments. More specifically, the study addresses three main questions: (1) How do users from different cultural backgrounds perceive the cognitive, affective, and cultural dimensions of the National Library's virtual literary tourism service? (2) Are there significant differences in the perceptions of users with varied cultural and digital profiles? and (3) What design and communication strategies can enhance inclusivity and intercultural engagement in virtual library tourism?

By addressing these issues, this research contributes to the growing global debate on intercultural digital experiences and virtual heritage communication, offering both theoretical and practical perspectives. Theoretically, it broadens the application of user experience (UX) theory to intercultural contexts in digital literacy environments. Practically, it provides valuable guidance to library managers and digital designers for the development of culturally appropriate, emotionally engaging, and user-centered virtual services that promote intercultural understanding and inclusive access to knowledge in ASEAN and beyond. This study also serves as a preliminary investigation into the intercultural user experience in virtual library environments, providing fundamental insights that can guide future large-scale research.

2. METHODS

his study used user experience (UX) theory as a conceptual framework to understand how Indonesian and Malaysian students formed their opinions about the virtual literary tourism service offered by the National Library of Indonesia. UX theory emphasized that user experience was not only determined by functional aspects such as ease of access and understanding of content (cognitive dimension), but also by emotional responses such as satisfaction, interest, and enjoyment while using the service (affective dimension) (Haider et

al., 2025; Li et al., 2020; Xie, 2023). In the context of virtual tours, immersive, interactive, and enjoyable experiences had been shown to improve perceived value, user satisfaction, and users' intention to continue using the service in the future (Shu & Jinghan, 2024). By analyzing the perceptions of students from two different cultural backgrounds through the lens of user experience, this study revealed how digital experiences were influenced by a combination of personal, emotional, and cultural factors.

This study used a quantitative method with a comparative design to examine intercultural differences in the perception of literary tourism services provided by the National Library of Indonesia. A quantitative approach was considered appropriate because it allowed for the objective measurement of user perception using numerical data that could be analyzed statistically (Watts et al., 2022). The comparative design allowed for a structured and systematic comparison between two groups of respondents from different cultural backgrounds: students from Widyatama University (Indonesia) and Technology MARA University (Malaysia).

The sampling technique used in this study was purposive sampling. The target population consisted of undergraduate students from Indonesia and Malaysia who had accessed the National Library's virtual tour service via its official website. A total of 100 respondents participated in this research, including 50 Indonesian students and 50 Malaysian students. The inclusion criteria were as follows: (1) being an active undergraduate student, (2) having accessed the National Library's virtual tour, and (3) being willing to voluntarily complete the online questionnaire. The demographic distribution of respondents is summarized in Table 1.

Table 1. Demographic distribution of respondents

No	Country	Male	Female	Total	Mean Age (years)	Mean GPA	Major / Discipline
1	Indonesia	14	36	50	20.8	3.42	Library and Information Science.
2	Malaysia	6	44	50	21.1	3.47	Information Management, Media Studies, and Education
	Total	20	80	100	20.9 (avg.)	3.45 (avg.)	

A priori power analysis was performed using GPower 3.1* software (Faul et al., 2009) to determine the minimum sample size required to achieve adequate statistical power. The parameters were as follows: t-test for independent samples (two-tailed), significance level (α) = 0.05, desired power (1–β) = 0.80, and expected average effect size (d = 0.50), based on Cohen (1988). The analysis indicated that a minimum of 64 participants per group (N = 128) would be required to detect medium effects with 80% power.

Due to several practical constraints, the final sample included 50 participants per group (N = 100). These constraints included the limited number of international users who accessed the virtual tour during the data collection period (November-December 2024), strict eligibility checks (minimum commitment of 5 minutes and completion of all selection questions), and voluntary participation without incentives. Response rates were moderate: 68.5% for Indonesian respondents and 61.7% for Malaysian respondents. A post-hoc power analysis revealed that the sample obtained had a power of 0.70 to detect medium effects (d = 0.50), a power of 0.95 for large effects (d = 0.80), and a power of 0.34 for small effects (d = 0.20). This confirms that the study was sufficiently powerful to detect medium to large effects, which are the most significant in practical user experience research, even though small effects may have

gone undetected. The sample size is consistent with that of other exploratory cross-cultural studies on user experience (Anderson et al., 2024).

The data was collected using an online questionnaire structured around the three dimensions of UX theory: cognitive (ease of use, clarity, navigation), affective (satisfaction, interest, emotional comfort), and cultural (interpretation of content and values). The questionnaire included 10 questions divided among these dimensions (three cognitive, three affective, and four cultural). The final number of questions is the result of slight modifications made during pilot testing, during which two redundant cognitive statements were removed to improve clarity and internal consistency.

The questionnaire included representative questions such as "*The virtual tour was easy to navigate*," "*I felt like I was inside the National Library building*," and "*The content reflects Indonesian cultural values and knowledge*." All questions were originally written in English and then translated into *Bahasa Indonesia* and *Bahasa Melayu* to ensure semantic equivalence. Two bilingual experts validated the translations to ensure linguistic and cultural clarity. A pilot test involving 15 students (8 Indonesians and 7 Malaysians) was conducted to ensure the clarity and ease of use of the online survey tool. Minor linguistic changes were made based on the feedback received.

All questions in the questionnaire used a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5). Each response was digitally coded and averaged by UX dimension according to the following formula:

$$\text{Mean Score for Each Dimension} = \frac{\sum_{i=1}^{n} X_i}{n}$$

where X_i represents each respondent's individual score for each item, and n is the total number of respondents. Average scores were used to identify general trends in perception and compare the responses of Indonesian and Malaysian participants.

Prior to the main analysis, the validity and reliability of the instrument were assessed. Validity tests using item-total correlation revealed positive and consistent relationships between items ($r = 0.47$–0.82), confirming conceptual validity. Reliability tests yielded a Cronbach's alpha coefficient of 0.94, indicating excellent internal consistency. A summary of these results is presented in Table 2.

Table 2. Results of instrument validity and reliability testing

Test Type	Method Used	Result / Value	Interpretation
Validity	Item–Total Correlation	r = 0.47–0.82	All items valid (r > 0.30)
Reliability	Cronbach's Alpha	0.94	Very high internal consistency

Data collection was conducted online between November 15 and December 20, 2024, using Google Forms. Recruitment was carried out via institutional emails and student WhatsApp groups, accompanied by an invitation message explaining the purpose of the study and ethical safeguards. Only participants who met the inclusion criteria and answered all questions in the questionnaire were included in the dataset.

The collected data were analyzed using descriptive and inferential statistical approaches. Descriptive analysis was used to summarize demographic characteristics and trends in perception, while inferential analysis used independent sample t-tests to identify significant differences between groups. All analyses were performed using SPSS version 26

software, ensuring data accuracy and reproducibility. Table 3 summarizes the data analysis process.

Table 3. Summary of data analysis procedures

Analysis Type	Purpose	Statistical Technique / Tool	Output
Descriptive Analysis	To describe respondents' demographic profiles and general perception trends	Frequency, Mean, and Standard Deviation	Tables and charts of perception levels
Inferential Analysis	To test significant differences between Indonesian and Malaysian students	Independent Samples t-test using SPSS v.26	p-values and significance levels (p < 0.05)

Preliminary tests showed that the data met the criteria for normality and homogeneity. Shapiro-Wilk tests indicated a normal distribution (p > 0.05), and Levene's test confirmed the homogeneity of variances (p > 0.05), thus validating the relevance of the t-test for this dataset.

This study also complied with ethical research principles, ensuring voluntary participation, anonymity, and informed consent. Respondents were informed of the study's purpose and their right to withdraw at any time. While the quantitative approach effectively captured general patterns of perception, it did not explore the deeper cultural meanings behind the responses. It is therefore recommended that a follow-up qualitative study be conducted to further contextualize these findings within the sociocultural realities of engagement with digital culture.

3. RESULTS AND DISCUSSION

The following section presents the results of the independent samples t-test conducted to compare the perceptions of Indonesian and Malaysian students based on the questionnaire data. Table 4 indicates whether there are significant differences for each question in the questionnaire based on the nationality of the respondents.

Table 4. Summary of hypothesis testing by UX dimension

UX Dimension	Item	Indonesia M (SD)	Malaysia M (SD)	t	df	p	Cohen's d	95% CI [LL, UL]	Sig (p < .05)
Cognitive	The virtual tour was easy to access on my device	4.19 (0.61)	3.92 (0.74)	1.15	98	.259	0.36	[-0.26, 0.98]	No
	The navigation through the virtual tour was easy to understand	3.86 (0.72)	3.85 (0.69)	0.05	98	.960	0.01	[-0.60, 0.63]	No
	I did not experience technical issues during the virtual tour	3.95 (0.65)	3.81 (0.70)	0.93	98	.357	0.26	[-0.36, 0.88]	No
Affective	The visual appearance (images, space, resolution) was very engaging	3.81 (0.79)	4.15 (0.68)	-1.42	98	.164	0.41	[-0.15, 0.97]	No
	I felt as if I were inside the National Library building	3.62 (0.72)	4.15 (0.61)	-2.09	98	.044*	0.81	[0.02, 1.06]	Yes
	The 360-degree feature made the experience more immersive	4.00 (0.75)	4.19 (0.67)	-0.87	98	.390	0.24	[-0.38, 0.86]	No
Cultural	I gained useful information from the virtual tour	4.00 (0.64)	4.08 (0.62)	-0.42	98	.680	0.12	[-0.49, 0.73]	No
	This service helped me understand the function and role of the National Library	3.95 (0.71)	4.04 (0.59)	-0.43	98	.667	0.13	[-0.48, 0.74]	No

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I consider this service a form of digital literacy tourism	4.14 (0.68)	4.31 (0.63)	-0.83	98	.407	0.22	[-0.40, 0.84]	No
The content reflects Indonesian cultural values and knowledge	4.10 (0.75)	4.42 (0.57)	-1.56	98	.125	0.46	[-0.11, 1.03]	No

The results show that Indonesian and Malaysian students' overall perceptions of the National Library of Indonesia's virtual literary tourism service is positive and largely consistent. Of the ten items measured, nine showed no statistically significant differences (p > 0.05), suggesting comparable experiences in terms of ease of use, satisfaction, and cultural relevance between the two groups. Only one indicator, "I felt like I was inside the National Library building," showed a significant difference (t (98) = –2.09, p = 0.044, d = 0.81, 95% CI [0.02, 1.06]), with Malaysian respondents reporting a stronger sense of presence. This significant effect indicates that Malaysian students experienced greater emotional immersion, perhaps due to the cultural novelty of virtually exploring a foreign institution.

From a more general user experience perspective, these results indicate that the virtual tour interface design offers a universally accessible experience, particularly in the cognitive domain. The high average scores (M = 3.81-4.19) and small effects (d < 0.30) for all cognitive indicators confirm that users from both cultures found the system equally usable and technically reliable. This consistency suggests that the National Library platform adheres to universal usability principles (clarity, consistency, and simplicity), thereby minimizing cognitive barriers for intercultural users.

The affective dimension showed strong engagement in both groups, with Malaysian participants displaying a higher sense of presence. This pattern corresponds to the "*cultural novelty effect*," whereby users unfamiliar with the culture represented tend to exhibit deeper emotional responses. Visual and interactive features such as 360-degree views and high-resolution images were perceived positively by both groups (p > 0.05), reflecting the immersive quality of the tour design. Overall, the results highlight that emotional engagement is influenced not only by design aesthetics, but also by cultural distance and user expectations.

Regarding the cultural dimension, all four indicators received high scores (M = 3.95–4.42) with no significant differences between groups. This suggests that Indonesian and Malaysian students perceived the visit as an effective representation of Indonesian cultural identity. The slightly higher average scores of Malaysian respondents imply that international users may derive greater cultural enrichment when interacting with foreign digital heritage content. The results confirm that the virtual tour successfully employs a culturally appropriate design, presenting Indonesian values authentically to both domestic and international audiences.

Overall, these findings underscore that effective literacy-focused virtual tourism integrates functional clarity, emotional resonance, and cultural authenticity. While cognitive usability ensures inclusive access, affective and cultural design elements enrich user engagement and cross-cultural understanding. The National Library's virtual tour thus illustrates how digital platforms can serve as both educational and intercultural communication tools throughout the ASEAN region and beyond.

Table 5. Summary of reliability coefficients by UX dimension

UX Dimension	Number of Items	Cronbach's Alpha (α)	Reliability Level	Interpretation
Cognitive	3	0.88	High	Items measuring functional ease and navigation show strong internal consistency.
Affective	3	0.91	Very High	Emotional engagement indicators (interest, immersion, enjoyment) are highly consistent.
Cultural	4	0.86	High	Cultural perception items demonstrate stable inter-item relationships.
Overall Scale	10	0.94	Very High	The total instrument achieves excellent reliability across dimensions.

Following the reliability analysis presented in Table 5, the results obtained for the three dimensions of user experience (UX)—cognitive, affective, and cultural—demonstrate a consistent and overall positive assessment of the National Library's virtual literary tourism service. For the cognitive dimension, the three indicators (ease of access, clarity of navigation, and technical performance) showed no significant difference between Indonesian and Malaysian students (p > 0.05), with average scores between 3.81 and 4.19 and small effects (d = 0.01-0.27), confirming that the virtual tour interface meets universal usability standards. In the affective dimension, only one indicator, sense of presence, revealed a statistically significant difference, with Malaysian students reporting higher emotional immersion (M = 4.15, SD = 0.61) than Indonesian students (M = 3.62, SD = 0.72), t (98) = −2.09, p = 0.044, d = 0.81. This suggests that Malaysian participants experienced stronger affective engagement, perhaps due to the novelty of exploring a foreign cultural space. The other affective indicators (visual appeal and 360° functionality) revealed no differences (p > .05), indicating similar enjoyment of the visual and technological elements across cultures. In the cultural dimension, the four indicators showed no significant differences between groups (p > 0.05, d = 0.13-0.43), although Malaysian students consistently gave slightly higher ratings, particularly about the representation of Indonesian cultural values (M = 4.42 vs. M = 4.10, p = 0.125). These results confirm that the virtual tour effectively communicates Indonesian cultural heritage and provides an inclusive digital experience that resonates with both domestic and international audiences.

This exploratory study examined the intercultural perceptions of the Indonesian National Library's virtual literary tourism service among Indonesian and Malaysian university students through the lens of user experience theory. The results reveal that, despite their distinct national contexts, students from both countries perceived the virtual tour similarly across most cognitive, affective, and cultural dimensions. Of the ten indicators measured, only one, the sense of presence in the affective dimension, showed a statistically significant difference, with Malaysian students reporting stronger emotional immersion. This section interprets these results in the broader context of cross-cultural digital engagement, virtual heritage communication, and innovation in libraries, while discussing the theoretical contributions, practical implications, and limitations of the study.

Cross-Cultural Consistency in Cognitive Perceptions: Universal Usability in Action

The absence of significant differences between the three cognitive indicators (ease of access, clarity of navigation, technical performance) confirms the idea that well-designed digital interfaces can transcend cultural boundaries when they adhere to universal principles of usability. Indonesian and Malaysian students gave high scores to the cognitive aspects of the virtual tour (M = 3.81-4.19), with negligible to small effects (d = 0.01-0.27), indicating

minimal practical differences in how users from these two cultural contexts perceived the functional aspects of the system.

This conclusion is consistent with the principles established in human-computer interaction research, which postulate that effective digital design must prioritize clarity, consistency, and simplicity, regardless of the user profile (Awasthi et al., 2025; Patel, 2023). When interfaces are intuitive and technically stable, cognitive load is minimized, allowing users to focus on content rather than navigation, which is essential for ensuring equitable access to digital cultural resources (Tsipi et al., 2023). The high cognitive usability scores observed in this study suggest that *Perpusnas* has successfully implemented responsive design practices that adapt to various devices and contexts of use, thereby promoting inclusivity in access to digital libraries.

From a theoretical perspective, these findings reinforce the cognitive dimension of user experience theory, which emphasizes that functional ease is a fundamental prerequisite for positive user engagement (Mishra et al., 2023). Without adequate cognitive support (clear navigation, accessible interfaces, stable performance), users are unlikely to progress toward deeper emotional or cultural engagement. The fact that both groups rated the cognitive aspects similarly indicates that the virtual tour provides a reliable technical foundation on which emotional and cultural experiences can build.

It is important to note, however, that cognitive similarity does not imply total cultural neutrality. Rather, it suggests that the interface has been designed in a sufficiently inclusive manner to accommodate users with varying levels of digital literacy and cultural expectations. Indonesia and Malaysia share significant linguistic and educational similarities, which may have facilitated this consistency. Future research involving more culturally and linguistically distant populations (e.g., users from non-Malay-speaking countries) would provide stronger evidence of the universality of usability.

Affective Engagement and the Cultural Novelty Effect

The most notable finding of this study is the significant difference between Malaysian and Indonesian students in terms of sense of presence. Malaysian participants reported feeling significantly more immersed in the virtual environment (M = 4.15, SD = 0.61) than their Indonesian counterparts (M = 3.62, SD = 0.72), with a large effect size (d = 0.81). This result is particularly significant, as it is the only indicator out of ten to reach statistical significance, and the effect far exceeds Cohen's threshold for practical significance (Brydges, 2019).

This phenomenon can best be explained through the lens of the cultural novelty effect, a phenomenon observed in the field of tourism and virtual experience research, whereby individuals confronted with unfamiliar cultural contexts exhibit more vivid emotional responses and deeper engagement (Yuan & Hong, 2024). For Malaysian students, virtual access to the National Library of Indonesia represents an opportunity to explore a neighboring but distinct cultural space. Despite linguistic similarities between Indonesia and Malaysia, the two nations have unique historical trajectories, cultural symbols, and national identities. The virtual tour, by presenting Indonesia's literary and cultural heritage through digitized collections, architectural representations, and contextual narratives, likely sparked curiosity, discovery, and emotional resonance among Malaysian users who were less familiar with this specific institution.

Conversely, Indonesian students, many of whom may have had prior knowledge of the National Library or may even have visited it before, may have felt less emotional novelty. Familiarity can diminish the sense of wonder and presence that accompanies the discovery of something new (Jin et al., 2021). This does not mean that Indonesian students did not enjoy the experience; indeed, their average score of 3.62 still indicates moderate to high engagement. Rather, it suggests that the affective impact of virtual cultural experiences is moderated by users' prior exposure and cultural proximity to the content.

It is important to note that the other two affective indicators, namely visual appeal and 360-degree functionality, did not show any significant differences, indicating that both groups equally appreciated the aesthetic and technological elements of the visit. This suggests that while basic visual satisfaction is relatively universal, the deeper emotional dimension of "feeling like you're there" (sense of presence) is more sensitive to cultural and experiential factors. This distinction is essential for designers of virtual heritage platforms: technical features (e.g., high-resolution images, interactive elements) may appeal to users universally, but to create a strong sense of presence, it is necessary to understand the cultural context of users and tailor narratives to elicit an emotional connection.

These results contribute to the growing body of research on presence in virtual environments (Goncalves et al., 2020), extending it to the intercultural domain. Previous studies have largely focused on the technological determinants of presence (e.g., immersion, interactivity), but this study highlights that cultural context and user familiarity are equally important influences. For international audiences, virtual tours can serve as "cultural gateways," fostering emotional connections with foreign institutions and heritage. For domestic audiences, they may function more as convenient access points than as sources of engagement motivated by novelty.

Cultural Perceptions: Effective Representation Across Audiences

Despite the significant emotional difference, the cultural dimension revealed no statistically significant differences between the two groups. All four cultural indicators received high scores (M = 3.95-4.42) from Indonesian and Malaysian students, with small effects (d = 0.13-0.43). This result suggests that the virtual tour successfully communicates Indonesian cultural values and heritage in a way that resonates with both domestic and international users.

The slightly higher average ratings of Malaysian students on items such as "The content reflects Indonesian cultural values and knowledge" (M = 4.42 vs. M = 4.10, p = 0.125, d = 0.46) should be interpreted with caution, as these differences did not reach statistical significance. However, the directional trend corresponds to the broader pattern observed in the affective dimension: international users may perceive greater cultural enrichment when engaging with foreign heritage content, even if that content is not statistically distinctive in terms of objective perceptions.

This model aligns with the principles of culturally responsive design (Kumi-Yeboah & Amponsah, 2023), which emphasize the importance of designing digital systems that authentically represent cultural values while remaining accessible and meaningful to diverse audiences. The National Library's virtual tour seems to have struck an effective balance: it presents Indonesian cultural identity clearly enough for domestic users to recognize and affirm it, while being innovative and informative enough for international users to appreciate and learn from it.

From a theoretical perspective, these results corroborate the cultural dimension of user experience theory, which posits that users' cultural context influences their interpretation and appreciation of digital content (Santoso & Schrepp, 2019). However, the absence of significant differences also suggests that well-designed cultural content can elicit cross-cultural resonance, i.e., the ability to communicate meaning and value to diverse audiences without requiring extensive localization. This is particularly relevant in the context of ASEAN, where member states share historical, linguistic, and religious ties despite their national differences.

The high marks given by both groups in terms of cultural content also reflect the potential of the guided tour as a tool for digital cultural diplomacy. By presenting the National Library of Indonesia as a repository of knowledge and cultural heritage, the virtual guided tour not only serves educational purposes but also promotes a positive international perception of Indonesian culture. In an era of increasing digital connectivity, libraries and cultural institutions can leverage virtual platforms to extend their reach beyond national borders, thereby contributing to intercultural understanding and regional cooperation (Fanea-Ivanovici & Pana, 2020).

Theoretical Contributions

This study contributes to the theoretical advancement of cross-cultural user experience (UX) in digital library environments in several keyways. First, it extends the application of user experience theory beyond conventional usability and HMI research by demonstrating that its tripartite framework (cognitive, affective, and cultural dimensions) effectively accounts for how users from different national backgrounds perceive virtual library services. The finding that cognitive perceptions remain consistent across cultures while affective responses diverge highlights the importance of a holistic perspective on UX that integrates both functional and emotional factors. Second, the study provides empirical evidence of the cultural novelty effect in virtual environments, showing that Malaysian students experienced a stronger sense of presence when engaging in an unfamiliar cultural setting. This expands on previous tourism literature (Suciu et al., 2022; Yuan & Hong, 2024; Zhu, 2024) by illustrating that emotional responses related to novelty can also occur in the context of digital cultural experiences. Third, the consistency of cognitive evaluations between Indonesian and Malaysian participants reinforces the cross-cultural validity of universal principles of usability (Martins et al., 2022), confirming that well-designed digital interfaces can transcend linguistic and cultural barriers when guided by clarity, consistency, and simplicity. Finally, by integrating user experience theory with intercultural engagement frameworks, this study positions virtual library platforms as spaces for intercultural learning, where cognitive accessibility facilitates entry, affective immersion fosters connection, and cultural authenticity deepens mutual understanding.

4. CONCLUSION

This study revealed that Indonesian and Malaysian students generally shared a positive perception of the virtual cultural tourism services offered by the National Library, across cognitive, emotional, and cultural dimensions. Cognitively, both groups perceived the service as accessible and easy to navigate, indicating a well-designed and user-friendly digital interface. Emotionally, Malaysian students reported experiencing a stronger sense of immersion, likely due to the novelty of engaging with another country's digital cultural service. The cultural dimension showed no statistically significant differences, although both

groups acknowledged the value of the virtual tour in representing Indonesia's cultural identity.

However, it is important to recognize the limitation of employing a relatively small sample (n = 100) to represent two national populations. This limitation may have affected the generalizability of the findings and indicates the need for larger and more representative studies in the future. Therefore, rather than focusing on nationality as a determining variable, future research could adopt a broader perspective on intercultural digital engagement, examining how users from diverse cultural backgrounds experience digital literacy services regardless of national identity.

Overall, this study contributed to the growing discourse on global digital literacy and virtual cultural engagement. It demonstrated how virtual tourism in libraries can foster intercultural understanding, inclusivity, and knowledge exchange in the digital era, particularly as libraries continue to evolve into transnational spaces for learning and cultural diplomacy.

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