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***Exploring the Potential of Digitalisation in Urban Public Spaces to Enhance Place-Attachment through Genius Loci.***

# Mengeksplorasi Potensi Digitalisasi di Ruang Publik Perkotaan untuk Meningkatkan Keterikatan Tempat (Place-Attachment) melalui Genius Loci.

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**Abstrak**: Degradasi budaya lokal di tengah gelombang digitalisasi telah menciptakan paradoks dalam pengembangan ruang publik perkotaan, yang dapat menjadi platform untuk revitalisasi budaya. Penelitian eksploratif ini mengkaji potensi digitalisasi sebagai penguat genius loci untuk menanamkan keterikatan tempat dalam identitas budaya Melayu di Taman Gurindam Dua Belas di Tanjungpinang. Menggunakan pendekatan metode campuran, studi percontohan ini menggabungkan observasi lapangan, survei terhadap 15 pengunjung, dan wawancara mendalam dengan enam responden lintas generasi. Analisis menggunakan kerangka kerja Teori *Cultural-Historical Activity Theory (CHAT)* dan model *Tripartite*. Secara kuantitatif, dimensi perilaku memperoleh skor tertinggi (M=3,28; SD=1,07), melampaui dimensi afektif (M=3,02; SD=1,07) dan kognitif (M=3,00; SD=0,97), menunjukkan bahwa pengunjung tetap aktif menggunakan taman meskipun pemahaman budaya mereka terbatas. Dari enam elemen intervensi digital, fitur dengan peringkat tertinggi adalah simpul melingkar berbasis realitas tertambah (M=3,47; SD=0,99), diikuti oleh tempat duduk yang dilengkapi audio (M=3,31; SD=1,19), yang mencerminkan keragaman preferensi pengunjung. Secara kualitatif, muncul kesenjangan antara identitas simbolik budaya Melayu dan representasi fisik taman, serta antara generasi tua dan muda terkait akses terhadap teknologi.Intervensi digitalisasi berpotensi menjembatani kesenjangan tersebut, menghubungkan pengunjung dengan genius loci melalui kode QR, narasi audio, dan realitas tertambah. Selain itu, intervensi ini juga harus mematuhi prinsip-prinsip desain inklusif. Meskipun terbatas oleh ukuran sampel yang kecil, temuan awal ini merekomendasikan validasi lebih lanjut dengan sampel yang lebih besar dan pendekatan

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partisipatif lintas generasi untuk menciptakan ruang publik pesisir yang adaptif dan bermakna yang tetap berakar pada otentisitas budaya.

***Kata Kunci: Digitalisasi, Genius Loci, Keterikatan Tempat, Ruang Publik Perkotaan, Kepulauan Pesisir.***

***Abstract***: *The degradation of local culture amid the tide of digitalisation has created a paradox in the development of urban public spaces, which could become platforms for cultural revitalisation. This exploratory research examines the potential of digitalisation as a genius loci enhancer to instil place-attachment within Malay cultural identity at Gurindam Dua Belas Park in Tanjungpinang. Using a mixed-methods approach, this pilot study combined field observations, a survey of 15 visitors, and in-depth interviews with six respondents across generations. Analysis utilised the Cultural-Historical Activity Theory (CHAT) framework and the Tripartite model. Quantitatively, the behavioural dimension scored the highest (M=3.28; SD=1.07), surpassing the affective (M=3.02; SD=1.07) and cognitive (M=3.00; SD=0.97) dimensions, indicating that visitors remain active in using the park despite their limited cultural understanding. Of the six digital intervention elements, the highest-ranking feature was the augmented reality-based circular node (M=3.47; SD=0.99), followed by audio-enabled seating (M=3.31; SD=1.19), reflecting the diversity of visitor preferences. Qualitatively, a gap emerged between the symbolic identity of Malay culture and the park's physical representation, as well as between older and younger generations regarding access to technology. Digitalisation interventions have the potential to bridge this gap, connecting visitors to the genius loci through QR codes, audio narratives, and augmented reality. In addition, adhere to inclusive design principles. Although limited by a small sample size, these initial findings recommend further validation with a larger sample and a cross-generational participatory approach to create adaptive, meaningful coastal public spaces that remain rooted in cultural authenticity.*

***Keywords: Digitalisation, Genius Loci, Place-Attachment, Urban Public Space, Coastal Archipelago.***

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## I. INTRODUCTION

Gurindam Dua Belas Park in Tanjungpinang is a coastal public space with the potential to preserve Malay cultural identity (Hussain et al., 2020) and foster intergenerational social interaction. Several studies have demonstrated limitations in accommodating the needs of cross-generational users, such as those by Solina et al. (2022) and Gunawan et al. (2022), who found inadequate facilities for children and the elderly. Furthermore, this situation can weaken attachment to place, which should be rooted in the values of the genius loci as described by Norberg-Schulz (1980), and limit the participation of vulnerable groups in public spaces (Wendel et al., 2022).

The place-attachment approach explains the cognitive, affective, and behavioural bonds between individuals or communities and a place (Scannell & Gifford, 2010), providing a foundation for a tripartite framework useful for analysing how physical and digital changes affect everyday practices and the sense of ownership of space. An ideal public space must align historical context with contemporary solutions (Adamska, 2021) to avoid becoming rigid.

On the other hand, place-attachment can develop through the process of spatial meaning formation, influenced by genius loci, in which local values, identities, and user experiences are internalised within a space. This process not only strengthens an individual's emotional and cognitive connection to a place but also opens up opportunities for more participatory social engagement in the use and meaning of space. Studies by Utami (2017) and Novianti et al. (2018) demonstrate that social interactions and spatial experiences strengthen place-attachment within a community context. One such approach is digital adoption, although it can also create gaps in access, skills, and quality of technology (Wendel et al., 2022). Therefore, inclusive design based on a human-centred approach is needed to address this challenge (Avsec et al., 2024).

This study synergises three main pillars: local cultural identity, the presence of natural elements, and the potential of digital technology. It is assumed that when digital tools are developed through a human-centred systems-thinking approach, they can enhance user engagement (Avsec et al., 2024) and support the communication of cultural and environmental values. Appropriate integration is expected to strengthen the genius loci and increase community place-attachment.

Several issues have been identified at Gurindam Dua Belas Park. First, digital interpretation in public spaces remains limited (Basaraba, 2021), while Malay cultural narratives are not adequately integrated to convey genius loci effectively (Hussain et al., 2020). Second, the integration of natural elements and technology to create a multisensory experience remains inadequate (Fernandez-Osso Fuentes et al., 2024; Krzeptowska-Moszkowicz et al., 2021). Third, the lack of interactive platforms for visitors, such as augmented reality or digital storytelling (Floch & Jiang, 2015; Tom Dieck & Jung, 2016), ultimately influences the interpretation of the spirit of the place as genius loci and can weaken the transmission of cultural and environmental values between generations (Kasemsarn & Nickpour, 2025; Silva, 2015).

From these identified issues, three research gaps emerged as a focus. First, the lack of an integrative framework linking the digitalisation of public spaces to the strengthening of genius loci through an inclusive, human-centred approach (Avsec et al., 2024). Second, the use of digital technology has not been optimal in communicating cultural values specific to location contexts (Basaraba, 2021; Chatsiopoulou & Michailidis, 2025; Liu et al., 2024; Ramtohul & Khedo, 2024). Third, evaluation models for assessing the effectiveness of digital interventions in enhancing place-attachment remain limited (Vazquez et al., 2025).

Based on the problem identification, three research questions emerged:

1. How do visitors perceive the genius loci of Gurindam Dua Belas Park?
2. What are visitors' needs and preferences for digital interventions to communicate Malay cultural values?

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3. What are the descriptive patterns of the cognitive, affective, and behavioural dimensions of place-attachment in this cultural public space?

The exploratory pilot study had the following objectives:

1. Identify user perceptions of the genius loci through field observations and survey data.
2. Explore user needs and rank preferences for six digital intervention elements.
3. Describe the pattern of place-attachment dimensions of visitors to Gurindam Dua Belas Park, as follows: cognitive, affective, and behavioural.

The novelty of this research lies in integrating the concept of genius loci with digital interventions in the context of coastal urban public spaces with Malay cultural identity, a topic rarely explored in the literature. This contrasts with digital place-making studies that generally focus on urban spatial experiences (Basaraba, 2021; Morrison, 2022), augmented reality research for cultural heritage interpretation in museum environments (Ramtohul & Khedo, 2024; Tom Dieck & Jung, 2016), and studies of nature-based digital place-making for well-being (Fernandez-Osso Fuentes et al., 2024).

This study advances these perspectives by proposing an integrative analytical framework that links digital interventions, cultural representation, and place attachment. Specifically, it adopts Cultural-Historical Activity Theory (CHAT) and the Tripartite model to operationalise and examine how digital interventions can bridge intergenerational gaps in understanding cultural values and strengthening attachment to place.

## II. RESEARCH METHODS

This study specifically examines how potential digital transformation can strengthen the genius loci of Gurindam Dua Belas Park through an exploratory mixed-methods pilot study to obtain quantitative patterns of visitor perceptions and in-depth contextual insights from field observations, a place-attachment survey, and semi-structured interviews.

Field observations were conducted during data collection to describe user activity patterns and interactions with cultural elements, based on the views of Gunawan et al. (2022), who examined park facilities for cross-generational users as activity systems mediated by cultural tools and signs (Cong-Lem, 2022). The study adopted the Cultural-Historical Activity Theory (CHAT) as the basis for observing user activity patterns and identified six physical elements as potential points for digital intervention. These elements form the basis of digital interpretation in this study and are presented in Figure 1.

| No | Image | Thema | Context |
|---|---|---|---|
| 1 |  | Signage / Information Node (Entrance or Info Point) | Digital signage (QR, touchscreen) serves as a mediating tool for visitor learning about Gurindam Dua Belas, enhancing cultural interpretation and engagement. |
| 2 |  | Circular Node (Transit / Meeting Point) | A small circular junction where ambient or AR-triggered digital cues can foster interaction and wayfinding. CHAT views this as a space to mediate social activity. |
| 3 |  | Sea-Facing Bench (Reflection / Listening Point) | A resting point ideal for audio storytelling that mediates cultural reflection and experience, blending natural calm with narrative interpretation. |
| 4 |  | Pedestrian Pathway & Vegetation (Wayfinding / Edu Trail) | The walking path can host digital guides or plant-based interpretation. Such mediating tools enhance learning and interaction with the environment. |
| 5 |  | Landmark (Identity Marker) | The landmark "Gurindam Dua Belas" serves as a cultural identity anchor. Digital activation can enhance symbolic meaning and visitor attraction. |
| 6 |  | Open Green Area (Nature + Digital In-terpretation) | The green zone can integrate low-impact digital tools that interpret ecological and cultural connections to support environmental awareness, |

**Figure 1.**
Digital Interpretation Elements

Source: Developed based on field observations and CHAT (Cong-Lem, 2022)

After the observation phase, a place attachment survey was developed using the tripartite model of Scannell & Gifford (2010), which has three dimensions: cognitive, affective, and behavioural. The questionnaire, administered to 15 convenience sampling respondents, consisted of 10 items rated on a Likert scale from 1 to 5. The complete measurement instrument is presented in Table 1, including the distribution of items across dimensions.

**Table 1.**
Place-Attachment Measurement Instrument

| Code | Statement | Dimension |
|---|---|---|
| Cog_1 | I understand the cultural and historical values shown in Gurindam Dua Belas Park | Cognitive |
| Cog_2 | I can recognise the park's natural features, like plants and trees | Cognitive |
| Cog_3 | I think digital technology can help show visitors the park's cultural values | Cognitive |
| Aff_1 | I feel proud of the cultural identity embodied in the park's design. | Affective |
| Aff_2 | I feel comfortable and calm in the park because of its natural atmosphere. | Affective |
| Aff_3 | I have an emotional attachment to this park as part of Tanjungpinang's city identity. | Affective |
| Beh_1 | I would like to join digital activities or online promotions about this park | Behavioural |
| Beh_2 | I am willing to participate in park preservation activities, either directly or through digital platforms. | Behavioural |
| Beh_3 | I would recommend this park to others for its cultural value. | Behavioural |
| Beh_4 | I would like to try apps or technologies that tell stories about the park's culture | Behavioural |

Source: Developed based on Scannell & Gifford's (2010) tripartite model

Semi−structured interviews were conducted with 6 visitors aged 20–67, including local residents and visitors, both regular and occasional. Each interview lasted approximately 20−25 minutes and aimed to explore visitors' understanding of genius loci, their emotional and behavioural connection to the park, their needs and preferences for digital interventions, including intergenerational accessibility. Furthermore, a qualitative component was designed to complement and contextualise the survey findings, particularly in explaining why certain digital elements were preferred or why visitors felt disconnected from the park's cultural identity.

Survey data were analysed using descriptive statistics (mean, standard deviation, minimum, and maximum). Inferential tests were not conducted due to the small sample size (N = 15) and the exploratory nature of the study. This analysis was used to identify response patterns and provide initial rankings of digital intervention preferences. Instead, interview data were analysed thematically using manual coding to identify recurring patterns, generational differences, and visitor recommendations. Additionally, there are four theoretical articles to be reviewed and analysed thematically to support triangulation of the empirical findings with the conceptual framework, as follows: Floch & Jiang (2015); Kasemsarn & Nickpour (2025); Scannell & Gifford (2010); Tom Dieck & Jung (2016).

## III. RESULTS AND DISCUSSION

### A. Research Results

#### 1. Respindent Profile

A total of 15 respondents participated in the survey using a convenience sampling method. Participants were aged 20 to 55, with the productive age group 25 to 40 years old (60%). Based on visit frequency, 52.7% of respondents visited the park at least weekly. Meanwhile, 47.3% visited once or twice per month. Meanwhile, the semi-structured interviews included 6 visitors, purposefully selected to represent generational groups. The sample consisted of three generational groups: Gen Z (20-27 years old), Millennials (31-33, 44 years old), and Baby Boomers (62-67 years old). Respondents included both regular and first-time visitors, as well as local residents and those from outside the area.

#### 2. Instrument Reliability

The use of Cronbach's Alpha to assess the instrument's reliability demonstrated excellent internal consistency across all dimensions ($\alpha > 0.85$), thus categorising it as suitable for use as a composite score for descriptive purposes (Heo et al., 2015).

**Table 2.**
Instrument Reliability (Cronbach's Alpha)

| Dimension / Element | Cronbach's Alpha | Number of Items |
|---|---|---|
| Cognitive (Place-attachment) | 0.922 | 3 |
| Affective (Place-attachment) | 0.926 | 3 |
| Behavioural (Place-attachment) | 0.929 | 4 |
| Signage (Digital) | 0.939 | 3 |
| Circular Node (Digital) | 0.955 | 3 |
| Seating (Digital) | 0.896 | 3 |
| Pedestrian Pathway (Digital) | 0.858 | 3 |
| Landmark (Digital) | 0.858 | 3 |
| Open Green Area (Digital) | 0.924 | 3 |

Source: Data processing by the author

## 3. Place-Attachment Dimensions

Based on survey results from 15 respondents, the highest score was for the behavioural dimension (M = 3.28, SD = 1.07), followed by the cognitive (M = 3.00, SD = 0.97) and affective (M = 3.02, SD = 1.07) dimensions of place-attachment.

**Table 3.**
Place-Attachment Dimensions (N=15)

| Dimension | Mean | Std. Deviation | Min | Max |
|---|---|---|---|---|
| Cognitive | 3.00 | 0.97 | 1.67 | 4.67 |
| Affective | 3.02 | 1.07 | 1.33 | 5.00 |
| Behavioural | 3.28 | 1.07 | 1.50 | 5.00 |

Source: Data processing by the author

## 4. Digital Intervention

In the quantitative research, a Likert scale was used to evaluate six elements of the digital intervention, with the highest preference for AR-equipped circular nodes (M = 3.47, SD = 0.99), followed by audio-equipped seating (M = 3.31, SD = 1.19), and interactive signage (M = 3.27, SD = 0.92). Meanwhile, green open areas had the lowest preference with the lowest mean score (M = 2.82, SD = 0.94). .

**Table 4.**
Digital Intervention Elements (N=15)

| Element | Mean | Std. Dev. | Min | Max | Rank |
|---|---|---|---|---|---|
| Circular Node (AR) | 3.47 | 0.99 | 1.67 | 5.00 | 1 |
| Seating (Audio) | 3.31 | 1.19 | 1.00 | 5.00 | 2 |
| Signage | 3.27 | 0.92 | 1.67 | 5.00 | 3 |
| Landmark | 3.18 | 1.19 | 1.00 | 5.00 | 4 |
| Pedestrian Pathway | 3.11 | 0.89 | 1.67 | 4.67 | 5 |
| Open Green Area | 2.82 | 0.94 | 1.00 | 4.33 | 6 |

Source: Data processing by the author

## 5. Interview Themes

In qualitative research, the results of interviews with thematic analysis of 6 respondents identified four main themes: (1) lack of representation of Malay culture, (2) digital tools as a cultural bridge, (3) intergenerational gaps in technological convenience, and (4) authenticity and balance. These themes are summarised in representative quotes:

**Table 5.**
Interview Themes Analysis (N=6)

| Theme | Description | Example Quotes |
|---|---|---|
| Absence of Malay cultural representation | Lack of Malay atmosphere does not match the park's name | *"The name... is not evident in the park's design"* (X5) |
| Digital tools as a cultural bridge | AR, QR codes, and audio are needed to convey the meaning of Gurindam Dua Belas Park | *"AR can make the poem appear real"* (X4) |
| Intergenerational divide in technology comfort | Young people prefer AR/interactive experiences; older people prefer simple audio or staff assistance | *"I need help from somebody"* (X6) |
| Authenticity and balance | Digital devices complement efforts to strengthen the natural and cultural atmosphere | *"Excessive use can make the atmosphere feel artificial."* (X6) |

Source: Data processing by the author

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The thematic structure across the main themes can be summarised as follows: Under Malay Cultural Representation, three sub-themes emerged: Positive Representation (Coded: Pride & Cultural Identity, Symbolic Naming), which evokes pride but is not supported visually; Negative/Weak Representation (Coded: Weak Cultural Representation, Missing Cultural Expression, Limited Cultural Understanding), in which Malay identity is visually and narratively absent; and Expectation vs. Reality (Coded: Malay Identity Expectation, Cultural Curiosity & Disappointment), which creates hope even though it is not fulfilled by the design.

In the Digital Storytelling Experience, child themes are organised into three aspects: Media Preference (a tendency toward audio/visual formats), Learning Outcomes (moral and cultural education for children), and Technology Engagement (exploration supported by AR/QR tools). While AR/QR enhances exploration, its acceptance varies across generations.

Within Family & Social Dynamics, children's themes are reflected in Family Interaction (shared learning between parents and children), Social Recreation (behavioural engagement through collective activities), and Solitary Activities (personal relaxation through nature). Thus, the social dynamics in the park not only reflect the interconnectedness of behaviour but also strengthen the function of public space as a forum for interaction across generations and individuals.

Furthermore, Figure 2 illustrates a thematic network map connecting cultural, educational, technological, and emotional dimensions. The findings of this visualisation underscore the dynamics of intergenerational differences in the use of technology to enhance the genius loci and highlight how cultural authenticity and balance contribute to the emotional aspects of place-attachment.

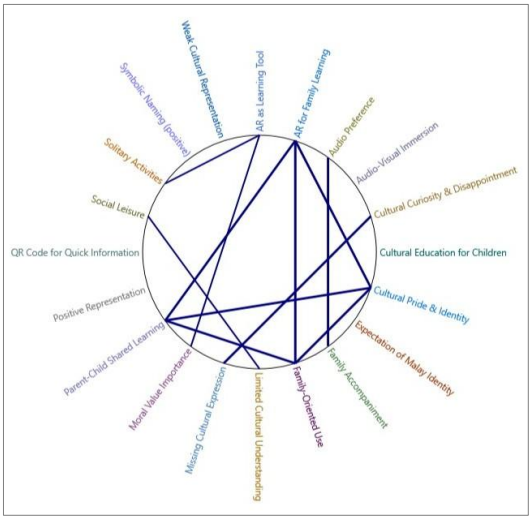



**Figure 2.**
Thematic network map of interview findings

Source: Data processing by the author

## B. Discussion

Based on the results obtained, there is a gap between cultural identity and spatial experience. Therefore, it is necessary to utilise digital intervention as an inclusive layer to bridge these gaps, thus enhancing the presence of genius loci in Gurindam Dua Belas Park. This discussion also integrates empirical findings with theoretical frameworks, as follows: Floch & Jiang, 2015; Kasemsarn & Nickpour, 2025; Scannell & Gifford, 2010; Tom Dieck & Jung, 2016 , as well as comparative empirical studies of similar coastal public spaces and cultural contexts.

### 1. Malay Culture and Its Implications

A gap between symbolic expectations and the physical reality of parks is revealed. Nursanty et al. (2023) stated that urban authenticity is rarely materially realised but is only claimed symbolically. Similarly, Liu et al. (2024) found that cultural elements are underrepresented in urban waterfronts, leading to weak visual preferences. Conversely, Silva (2015) showed that well-maintained structures embody the genius loci, emphasising the importance of physical markers.

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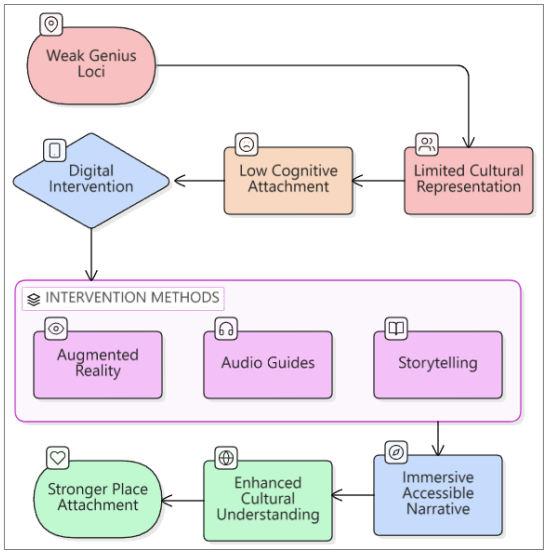



**Figure 3.**
The Conceptual Model

Source: Data processing by the author

Therefore, Scannell & Gifford (2010) argue that place-attachment requires cognitive and symbolic meaning, so that environmental quality and cultural cues influence psychological engagement and well-being in public spaces (Bratman et al., 2019). This explains the moderate cognitive (M=3.00) and affective (M=3.02) scores, reflecting weak visibility and lower than those reported by Novianti et al. (2018), who found that local cultural rituals were affectively integrated into the Krueng Cunda public space (M>3.8) to strengthen place-attachment.

## 2. Digital Intervention Preferences

Ramtohul & Khedo (2024) and Chatsiopoulou & Michailidis (2025) stated that AR use is more meaningful when associated with physical markers. This is consistent with the preference for AR-equipped circular nodes (M=3.47). Likewise, the use of audio-enabled seating (SD=1.19) demonstrates intergenerational variation. This is consistent with research by Kasemsarn & Nickpour (2025), who reported that older adults prefer audio over AR due to lower cognitive load, while younger users tend to engage more actively with AR environments due to greater digital fluency and exploratory interaction patterns (Julrode et al., 2026), as well as being driven by curiosity. These behaviours require novelty and quality interactions to increase engagement (Morrison, 2022).

**Table 6.**
Thematic Intergenerational Preferences for Digital Interventions

| Age Group | Preferred Technology | Example Quote |
|---|---|---|
| Gen Z | AR, interactive | X1: "AR is interactive and visually engaging." |
| Millennials | AR + storytelling | X3: "AR for family learning." |
| Baby Boomers | Audio, simple | X6: "I need help from somebody." |

Source: Data processing by the author

On the other hand, green open areas received a low rating (M = 2.82), indicating that restorative, sensory, and climate-responsive qualities remain insufficiently developed in Gurindam Dua Belas Park. This finding is consistent with studies emphasising the importance of these qualities in public spaces (Bratman et al., 2019; Ptak-Wojciechowska et al., 2021; Townsend et al., 2018), particularly in sensory gardens (Krzeptowska-Moszkowicz et al., 2021).

## 3. Place-Attachment Patterns

The behavioural dimension recorded the highest mean score (M = 3.28), while cognitive (M = 3.00) and affective (M = 3.02) scores remained moderate. This suggests that visitors may use the park and even recommend it without a deep understanding of the Malay cultural presence there. Although Scannell & Gifford (2010) conceptualised engagement as an interaction among three components, interview findings indicate that behavioural engagement can also be driven by natural amenities, such as ocean views, tranquillity, and social functions.

Therefore, Townsend et al. (2018) highlight the restorative qualities of public spaces that can generate positive behaviour even when symbolic engagement is weak. However, when behavioural

use is not supported by mechanisms for communicating cultural meaning, then functional engagement may not develop into deeper engagement. In this regard, digital storytelling and digital spatialisation can help mediate this transition to connecting use, meaning, and engagement (Basaraba, 2021; Fernandez-Osso Fuentes et al., 2024).

### 4. Digital Authenticity

The emphasis on identity rooted in cultural and natural values cannot be replaced by digital use. Instead, they should reinforce each other, both in terms of cultural and natural authenticity. This aligns with Kasemsarn & Nickpour's (2025) concept of the authenticity gap and Floch & Jiang's (2015) argument that storytelling should enhance existing narratives rather than replace them. Nursanty et al. (2023) cautioned that excessive digitalisation could erode perceived authenticity, while Morrison (2022) argued that digital layers should augment spatial experience rather than dominate it.

Therefore, low-intensity optional features such as QR codes and low-noise seating were preferred because they allowed visitors to maintain control over their experience, consistent with the preference for low-intensity interventions reported by Fernandez-Osso Fuentes et al. (2024). Digital interventions should therefore be context-sensitive and responsive to the park's coastal environment, Malay cultural heritage, and the needs of users across generations.

### 5. Accessibility and Design Implications

Digital intervention through AR-enabled circular nodes (M=3.47) received the highest preference in the questionnaire, indicating user interest in immersive and interactive interpretation, as also found in studies on the use of AR for the promotion and interpretation of cultural spaces (Widayaningsih N. H. & Handriyotopo H., 2020). This finding was also supported by interviews, where several respondents expressed interest in more interactive digital experiences. However, access to AR can vary across age groups and levels of digital literacy. For instance, most older adults may face challenges with device handling, interface complexity, and cognitive load (Julrode et al., 2026; Kasemsarn & Nickpour, 2025). This aligns with interview findings from a Baby Boomer respondent (X6) who stated, "I need help from someone."

Thus, a multimodal approach is needed. Audio-based content (M=3.31) is the most inclusive option, requiring minimal digital skills while supporting storytelling (Yudhawasthi & Wangsalegawa, 2025). QR codes (M=3.27) serve as a low-threshold bridge, complementing rather than replacing AR (Solima & Izzo, 2017). Therefore, inclusive design should prioritise AR as the core experience, with QR and audio as flexible entry points for children, seniors, and people with disabilities (Szaszák & Kecskés, 2020; Wallis et al., 2023). Although this study could not verify all accessibility barriers, the strong preference for audio content guides how the park's cultural message should be conveyed.

**Table 7**
Summarises these intergenerational preferences with example quotes

| Aspect | Key Finding | Design Implication |
|---|---|---|
| Place-Attachment | Behavioural highest (M=3.28). Visitors recommend park even without deep understanding. *(Scannell & Gifford, 2010)* | Strengthen cognitive meaning through visible narratives |
| Cultural Identity | Moderate cognitive (M=3.00) & affective (M=3.02). Weak representation, disappointment expressed. *(Floch & Jiang, 2015)* | Add visible Malay symbols, storyboards, poem excerpts |
| Digital Preference | AR circular node ranked first (M=3.47). Curiosity-driven interest, but limited under-standing. *(Tom Dieck & Jung, 2016)* | Prototype-based implementatio n with clear instructtions |
| Accessibility | Audio seating second (M=3.31). Older users prefer audio; need help with AR. *(Kasemsarn & Nickpour, 2025)* | Multimodal system: AR for the younger, audio for the older |

Source: Data processing by the author

### 6. Limitations and Future Research

Reliability analysis yielded Cronbach's alpha values above 0.9 for the subscales, supporting the internal consistency of the composite measures and their use for descriptive purposes (Heo et al., 2015). However, the small sample size (N = 15 for the survey; N = 6 for interviews), convenience sampling, and the absence of pre- and post-intervention measurements limit the generalisability of the findings and the ability to assess causal effects of digital interventions. Whilst Vazquez et al. (2025) suggest that user perceptions can inform preliminary evaluations, stronger evidence will require larger samples and more rigorous experimental or longitudinal designs. Likewise, although this study indicates possible intergenerational differences in digital preferences, these were not examined systematically; future research should therefore apply inferential statistics and participatory, inclusive design approaches involving children, older adults, and people with disabilities to co-create digital interventions for other Malay heritage sites or similar coastal public spaces (Karanasios et al., 2021; Szaszák & Kecskés, 2020; Wendel et al., 2022).

## IV. CONCLUSION

This study yielded three main findings. First, visitors perceived a gap between the park's symbolic identity and its physical representation of Malay culture, requiring interpretive strategies to translate meaning into spatial experience. Second, digital preferences varied by generation: younger users favoured augmented reality, while older users preferred simple audio. Third, behavioural place-attachment exceeded cognitive and affective dimensions, indicating active engagement despite limited cultural understanding.

Theoretically, digital interpretation can bridge users to the genius loci in culturally underrepresented public spaces (Floch & Jiang, 2015), supporting digital placemaking that links spatial experience, cultural meaning, and engagement (Fernandez-Osso Fuentes et al., 2024; Morrison, 2022). Practically, implementation should start with low-intensity interventions like QR codes with audio narratives (Solima & Izzo, 2017), progress to AR and sensory enhancements (Chatsiopoulou & Michailidis, 2025; Ramtohul & Khedo, 2024), and adhere to universal design principles (Szaszák & Kecskés, 2020; Wendel et al., 2022). Long-term evaluation via post-implementation surveys and cross-generational co-design is needed (Vazquez et al., 2025). Ultimately, digital interventions can strengthen place-attachment by enhancing the genius loci, helping Gurindam Dua Belas Park become a more sustainable, inclusive, and meaningful coastal public space that balances innovation with cultural authenticity (Adamska, 2021; Nursanty et al., 2023).

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