Cultural Tourism Experience in the Digital Age: Design of Gamified Digital Tool for the Younger Generation

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Received July 31, 2024 Revise August 31, 2024 Accepted December 31, 2024

Abstract

In today's rapid digitalization and information age, traditional cultural tourism methods can no longer meet modern tourists' changing needs and expectations. The introduction of gamification and digital tools provides essential opportunities for development in the tourism industry. This paper reviews the existing literature on gaming and digital tools for cultural tourism and proposes a new approach that combines gamification and digital tools.

The study presents the various stages and methods required to design gamified digital tools for cultural tourism based on the mechanism-dynamic-aesthetic (MDA) framework. It emphasizes how it can adapt to the personalized experience needs of the younger generation. Researchers outline future research areas, focusing on making cultural tourism more sustainable by finding exciting and innovative ways to engage tourists in cultural tourism. The results are of enormous significance for understanding the role of gamification in enhancing the cultural tourism experience and providing application guidance for product design in cultural tourism. Based on the previous user analysis, this study developed a gamification digital tool for cultural tourism based on the MDA framework, aiming to enhance the tourism participation and experience of younger tourists. Further research will concentrate on the outcomes of implementing digital gamification tools, specifically examining whether these tools foster positive attitudes and emotions among tourists, thereby enhancing their understanding of the attractions and fostering shared experiences. Suppose the results of this study can help improve the digital natives' tourism experience. In that case, we hope to explore its wide application and long-term impact in different cultural contexts through further research and promote the sustainable development of cultural tourism.

Keywords: gamification, digital tools, cultural tourism, product design

Introduction

With the rapid development of the global cultural tourism industry, how to promote the sustainable development of cultural tourism while improving the tourist experience has become an important research topic. Relevant studies have shown that traditional cultural tourism methods are often based on passive visits, lack interaction and participation, and make it difficult to achieve a co-creative experience between tourists and cultural attractions (Binkhorst & Den Dekker, 2013). This method is challenging in stimulating the interest and

enthusiasm of tourists, especially for the younger generation (Skinner et al., 2018).

Huizhou, located in Guangdong Province, China, has a long history dating back to the Sui Dynasty. It is China's national historical and cultural city. Huizhou City is rich in cultural tourism resources, including many historical and cultural celebrities, cultural heritage, and cultural landmarks. Tourism has become one of the pillar industries of Huizhou's economy. In 2019, Huizhou City received 65.41 million tourists, and tourism revenue reached 8.26 billion US dollars, accounting for 13.57% of the city's Gross Domestic Product (GDP). To meet the increasingly diversified needs of tourists and promote the sustainable development of the local cultural tourism industry, Huizhou City is actively implementing a digitalization strategy for tourism public services. The core of this transformation strategy is to use digital technology to provide tourists with a more diversified cultural tourism experience (Government, 2021). Therefore, exploring new ways to enhance tourists' participation and experience is particularly important.

Gamified digital tools offer an innovative solution to boost tourists' engagement and enrich their cultural tourism experience. To achieve this goal, we designed a prototype using user-centered design (UCD) principles based on the MDA framework. The gamified digital tool combines interactivity, information richness, and fun to enhance the experience and sustainability of Huizhou's cultural tourism. This paper will explore how this gamified digital tool can help tourists gain a deeper understanding and experience of Huizhou's cultural heritage.

Literature Review

This chapter examines the various settings where cultural tourism has successfully implemented gamification and digital tools. It outlines the opportunities for gamified digital tools to enhance tourists' travel experiences in the cultural tourism context. It also analyzes the strategies for developing gamified digital tools in Huizhou's cultural tourism context. Our future research will focus on how this may impact tourists' experience and behavior when participating in cultural tourism.

Digital Tools in Tourism

Digital tools are a key focus of our research, as they provide an interactive platform to implement gamification experiences. According to the World Tourism Organization, tourism digital tools are defined as all means and platforms that use information and communication technology (ICT) to support and enhance the tourism experience (UNWTO, 2021). We can trace the origin of tourism digital tools to the early application of information and communication technology (ICT) in the tourism industry. In the 1990s, the popularization of the Internet and the rise of online travel booking systems marked the beginning of tourism digitalization. Early tourism digital tools mainly included online booking systems, tourism information websites, and email communication platforms, which significantly improved the convenience of obtaining tourism information and the efficiency of the booking process (Buhalis, 2003). Entering the 21st century, with the popularization of mobile internet and smartphones, tourism digital tools have ushered in rapid development. The tourism industry has widely used new technologies like mobile applications, social

media platforms, and extensive data analysis to enhance the personalization and interactivity of the tourism experience (Bayram, 2020; Xiang et al., 2015).

Tourism In different stages of tourism, digital tools play different roles. For instance, before traveling, people primarily use digital tools for information search and itinerary planning (Kang et al., 2020). During the trip, applications such as navigation, travel route planning, and attraction interpretation provide tourists with convenient information services (Widarti & Emanuel, 2020). After the trip, tourists can comment or share their travel experiences through social media platforms (Abbasi et al., 2023).

This study focuses on improving tourists' experiences during the trip through gamified digital tools. During the trip, digital tools can provide real-time navigation, personalized travel route recommendations, and detailed attraction interpretations so that tourists can have a richer experience when exploring the destination (Widarti & Emanuel, 2020).

Digital media technology vividly presents historical sites and cultural stories, offering tourists an immersive and enriching experience. Digital tools can personalize services based on tourists' preferences, enhancing both efficiency and enjoyment of the tour. For instance, Mehmood et al. (2019) recommends the optimal route based on the tourists' real-time location.

Currently, digital tourism tools in Huizhou mainly include functions such as scenic spot explanation (text and audio) and route suggestions (text). Although these functions have partially achieved digital information transfer, their actual application has not fully utilized the advantages of digitalization, failing to effectively enhance tourists' interactive experience and interest (Vishnevskaya et al., 2015). In a previous survey, we studied 514 respondents and found that 174 people (33.85%) had never used Huizhou's cultural tourism digital tools, while 140 (27.23%) participants who had used them said that these tools did not meet their expectations.

It reflects significant room for improvement in existing digital tourism tools' functional design and user experience. This situation is broader than just Huizhou, and many other cultural tourism attractions also face similar problems (Vishnevskaya et al., 2015). In addition, relevant studies have shown that positive attitudes and emotions are important factors affecting people's willingness to use digital tools for tourism (Osman & Yatam, 2024; Jarrar et al., 2020). Despite the initial development of digital tools to enhance tourists' travel experiences, questions remain about how to create an attractive and exciting travel experience through these tools, and how to increase users' willingness to use them.

Gamification in Cultural Tourism

Gamification applies game design elements and principles to non-game situations to enhance user experience and engagement (Deterding et al., 2011). Huotari and Hamari (2017) deepened the definition of gamification: Gamification is a design approach that aims to enable systems, services, organizations, or activities to bring game-like experiences and motivations, thereby influencing user behavior. Gamification elements are the core components of the concept of gamification and the driving force that enables gamification to influence user behavior. They represent all the components and aspects required to design

and understand gamification (Schöbel et al., 2020). Typical gamification elements are points, badges, leaderboards, levels, narratives, clear goals, feedback, rewards, progress, and challenges (Hamari et al., 2014). Subsequent studies (Högberg et al., 2019) have widely recognized these gamification elements.

Tourism marketing, tourism services, and tourism management have extensively studied and used gamification in tourism in recent years (Pasca et al., 2020; Xu et al., 2016; Xu et al., 2013). Gamification stimulates tourists' interest and participation by setting exciting challenges and tasks and providing rewards and incentives (Eisingerich et al., 2019; Feng et al., 2020). For example, the "Turku Castle in Your Hands," launched by Turku University of Applied Sciences Applications, encourages visitors to experience Turku Castle's architecture and exhibits in an interactive way through game tasks and virtual rewards (Luimula & Trygg, 2016). This application further encourages visitor interaction and cooperation by introducing competition elements and teamwork tasks (Leclercq et al., 2018). In this way, gamification mechanisms can effectively shape the experience of competition and cooperation, increasing visitors' sense of participation and fun.

Gamification not only increases the fun of tourism, but also promotes visitors' learning and education about cultural tourism attractions in an entertaining way (Khan et al., 2020). Through engaging tasks, challenges, and puzzles, visitors can immerse themselves in the cultural narrative of the scenic spot, fostering a deeper connection and understanding. The "Canal Mystery" application, launched by the China Grand Canal Museum in Yangzhou, allows visitors to gain a deeper understanding and learn about the culture and history of the canal heritage through interactive decryption.

Compared with gamification, full games can provide a more immersive experience (Coenen et al., 2013). Some cultural heritage sites have even developed games that use technologies such as virtual reality (VR) and augmented reality (AR) to enhance visitors' interaction and participation (Mesáro et al., 2016; Zica et al., 2017). However, over-immersion may affect tourists' sense of authenticity (Boboc et al., 2022). Therefore, this study is based on gamification to ensure that while providing a rich interactive experience, it also maintains tourists' true feelings about the environment.

Research results and Discussion

Overview of Huizhou Gamified digital tools

Su Shi, one of the most famous cultural tourism resources in Huizhou, is one of the most important figures in ancient Chinese culture. Su Shi visited many scenic spots in Huizhou and created many poems depicting Huizhou's scenery and folk customs. These poems are not only literary treasures but also important documents for future generations to understand the history and culture of Huizhou. As the core cultural symbol of Huizhou's cultural tourism strategy, Su Shi and his related attractions are necessary cultural tourism resources. However, there are still deficiencies in developing and utilizing existing attractions. Despite the display of Su Shi's sculptures, portraits, and poems in the scenic area, the lack of a more vivid narrative experience and interactive element hinders tourists and attractions from collaborating to create unique experiences (Figure.1). This limitation prevents tourists from delving deeply into Su Shi's culture, resulting in a superficial and formal experience. It also provides an opportunity to introduce gamified digital tools.



Figure 1. Exhibits Related to Su Shi in the Scenic Area
Source: Photo by the Author

Huizhou Cultural Tourism Digital Tool provides not only traditional travel information services, such as introduction and explanation of scenic spots, travel route planning, exceptional food, and tourism product recommendations, but also combines innovative gamification mechanisms (tasks, points, and badges). Through field research and expert interviews, we present the stories of scenic spots as leisure tasks based on geolocation interaction. We utilize NPC (Su Shi) to disseminate tourism tasks associated with scenic spots, which serve as guides for users as they explore. While completing these tasks, users can unlock video content related to scenic spots. Tourists can earn points and badges by completing tasks and using related information services.

The MDA framework provides the foundation for the tool's development:

1. The tool encourages tourists to use digital tools for tourism through a task system and reward mechanism (points and badges) to gain a sense of accomplishment and satisfaction while exploring scenic spots.

2. In terms of dynamics, the tool uses geolocation technology and interactive tasks to enable tourists to conduct immersive exploration in real tourism, enhance interactivity and participation, and further deepen their understanding of the history and culture of scenic spots.

3. In terms of aesthetics, the tool presents tourists' cultural background and historical

stories of scenic spots in an attractive way through exquisite visual design and vivid storytelling, enhancing the overall tourism experience's pleasure and beauty.

Prototype development

The Huizhou cultural tourism digital tool undergoes a four-stage design and development process, with detailed descriptions of each stage provided below.

An overview of the application of gamified digital tools

The project's first stage requires researchers to understand how gamified tools serve tourists during tourism and the various background characteristics of their application. It can theoretically verify the feasibility of developing digital tools in this context. Our initial discussions with relevant experts envisioned the tool as a gamified interactive interpretation tool for scenic spots. However, the staff at the scenic spot quickly pointed out that this was not feasible because a single function could not meet the diverse needs of tourists. According to their return survey of tourists, some tourists explicitly suggested adding certain functions to improve the existing digital tools. Some stakeholders suggested adding commercial diversion recommendations to promote the development of tourism-related industries in the region (catering, shopping). These new directions forced us to reflect deeply on the goals of gamified digital tools, which are no longer limited to the interpretation tools originally envisioned.

The research team also worked with cultural tourism experts in Huizhou to find four sites that are closely connected to Su Shi and have a lot of cultural and historical value. These sites are Su Causeway, Wang Zhaoyun's Tomb, Hejiang Tower, and the Former Residence of Su Shi. They chose these sites as examples of how gamified digital tools could be used based on Su Shi's life in Huizhou and created a tourist route with Su Shi culture as the main theme (Figure 2).



Figure 2. The Su Shi Cultural Tour Route
Source: Created by the Author

Gamification goals and gamification strategies

The second stage is to determine the goals of gamification, which is a critical link in successfully implementing meaningful gamification (Kim, 2015). Xu et al. (2017) pointed out that designers need to clearly understand the needs and expectations of tourists and then combine them skillfully to create memorable, exciting, and attractive gamification experiences. Combined with the feedback from

scenic spot staff in the first stage, we conducted a study before the formal development of the prototype (Nie & Chaetnalao, 2024). The study aims to understand users' needs and expectations for cultural tourism gamification applications in Huizhou and identify target user groups for targeted gamification strategies. The study found that digital natives (Generation Y and Generation Z) are the core user groups of cultural tourism digital tools. We understand these tourists' functional needs, experiences, aesthetic preferences, and usage concerns for cultural tourism digital tools. These findings provide valuable reference and guidance for subsequent research and development, and the specific details will be presented in detail in the following work stages.

Based on their previous research, the researchers proposed the gamification goal of providing tourists with a tourism experience that is both practical, educational, and entertaining. We can specifically divide it into the following three strategies:

Integrate the cultural knowledge of tourist attractions into gamification tasks and enhance tourists' understanding and memory of the historical and cultural knowledge of the attractions through storytelling.

Incorporate gamification elements (such as points and badges) to motivate users to continue participating and using through instant interaction-generated feedback.

Provide convenient functions, tasks, and challenges related to geographical locations, taking into account tourists' authenticity and gamification experience.

Gamification dynamics and mechanisms

In the third phase, researchers began to study the mechanisms and dynamics of gamified digital tools based on the gamification goals and strategies established in the previous phase. We identified some information services that tourists can use on their own, as well as some tourism tasks and interactive content that require specific user actions to trigger. In the first category, digital tools provide traditional travel information services, such as attraction introductions and explanations, travel route planning, and exceptional food and tourism product recommendations. Users can easily access these services through the main interface. In the second category, we designed interactive tour tasks based on geolocation. For instance, we employed NPC (Su Shi) to disseminate tourism tasks associated with various attractions, thereby aiding users in their exploration. While completing these tasks, users can unlock video content related to the attractions.To ensure a close integration of the gamification mechanism with the actual travel experience, we also formulated some rules. These rules include task publication and completion, point accumulation and redemption, and badge acquisition and display. Tourists trigger or acquire these gamification elements during their actual travel process, while digital tools facilitate the interaction.

Design and development

The presentation of the product to the user is a crucial aspect of the fourth phase of

design and development.

Information architecture

The prototype consists of six modules (Figure 3). The map module provides users with an artistic, geographic identification system. The design emphasizes the map's visual appeal and user-friendliness while conveying the overall spatial layout and providing tourists with enough information for general exploration. The task module, which is at the heart of the gamification experience, encourages tourists to gain a deeper understanding of Huizhou's history and culture by setting cultural exploration tasks and challenges. The route module allows for customized travel routes, guiding tourists to follow a specific path for cultural exploration. The map module closely integrates with this module to offer tourists optimized travel routes. The food module showcases the Huizhou area's exceptional food and dining venues. Local tourism product sales connect the tourism product module, enabling users to unlock unique products or discounts through task completion. The personal center module records tourists' badges and points, encouraging users to share their experiences and continue to use the tool.

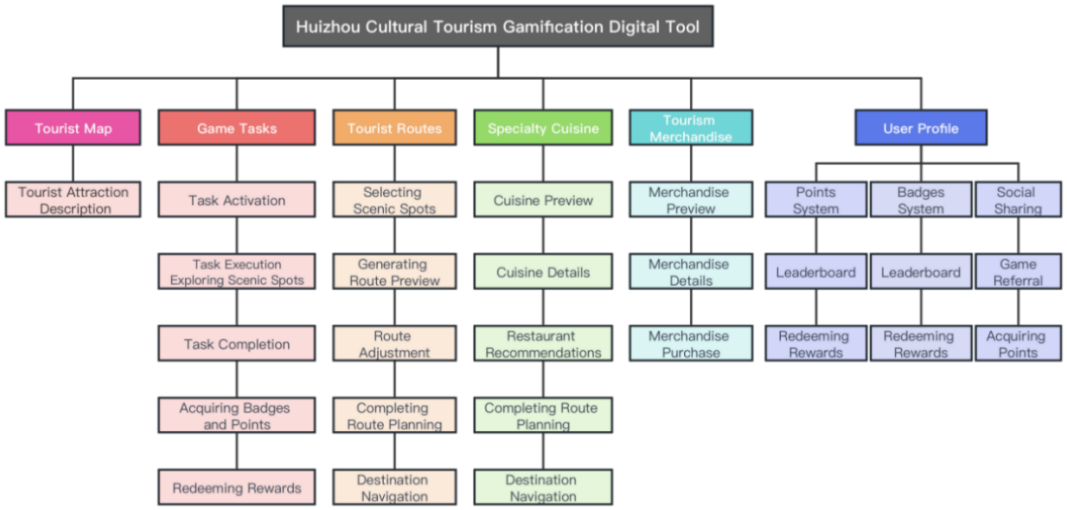


Figure 3. Information Architecture Diagram of Huizhou Cultural Tourism Gamified Digital Tools

Source: Created by the Author

interface design

Preliminary research found that tourists prefer colors closely related to the visual experience during travel. After a comprehensive analysis, the researchers selected six colors with rich cultural and semantic connotations. The researchers selected each color based on its cultural and semantic symbolic meaning, as well as its close connection to Huizhou's specific cultural tourism elements (Figure 4). We took black (RBG 0.0.0) from the lines of ink painting to reflect a solemn and restrained atmosphere. Ochre (RBG 136.71.72), as the representative color of ancient buildings, undoubtedly emphasizes the profound historical and cultural heritage. We selected blue gray (RBG 141.180.226) to symbolize stone walls, which further conveys a sense of stability and historical sedimentation. Huizhou's city flower, Bougainvillea, serves as the inspiration for pink (RBG 234.164.152) in this color scheme. This color signifies happiness and joy, as well as passion and a strong spirit. We use green (RBG 129.197.127) to express the vitality and vigor of nature. Beige (RBG 228.215.183),

inspired by the color of the book paper, is intended to highlight the value of learning in cultural tourism.

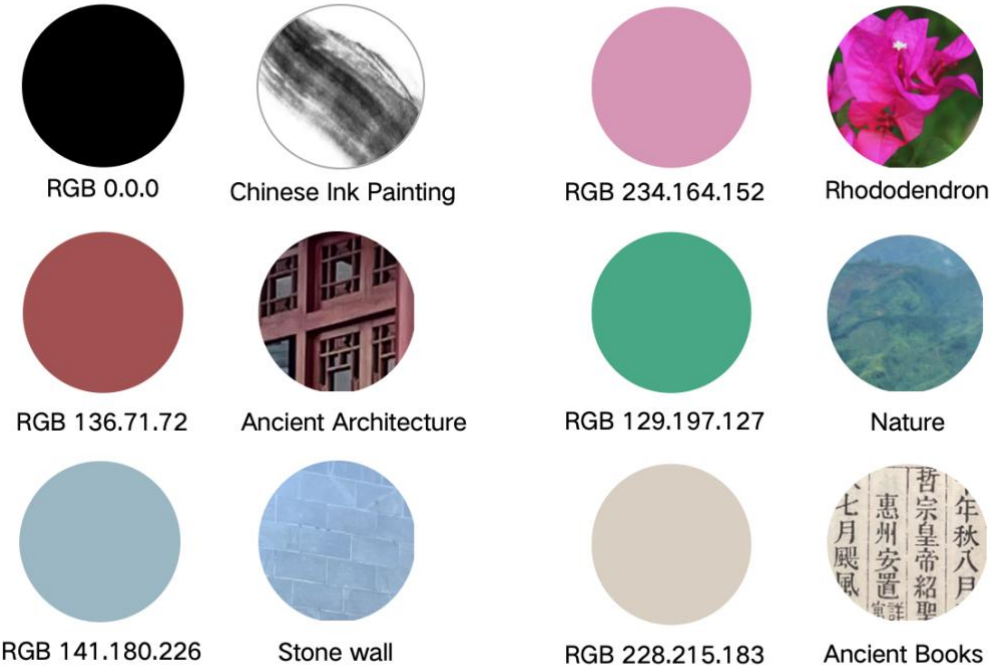


Figure 4. Color System of Huizhou Cultural Tourism Gamified Digital Tools

Source: Created by the Author



Figure 5. Icons of Huizhou Cultural Tourism Gamified Digital Tools

Source: Created by the Author

According to previous studies, the researchers chose the Chinese-style line drawing cartoon style, which is popular among respondents, for designing and producing charts. This style, with its vivid and friendly characteristics, can quickly attract users' attention and effectively create a relaxed and pleasant travel experience atmosphere. The researchers emphasized the intuitive association between shape and function in the icon's design. The researchers selected and adopted a series of well-known and easily recognizable visual symbols with a universal cognitive basis (Figure 5). This method not only ensures the intuitiveness of the icons, so that even first-time users can quickly identify and understand the functions of the icons, but also improves the universality of the icons.

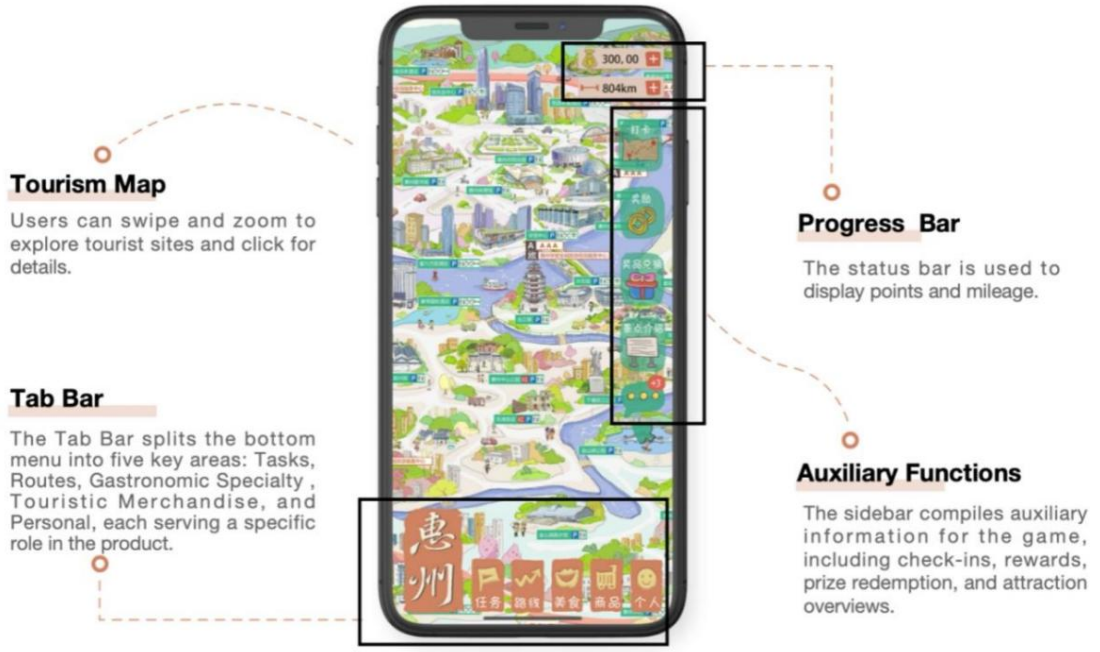


Figure 6. The main interface of Huizhou Cultural Tourism Gamified Digital Tools

Source: Created by the Author

The prototype divides its core interface content into four main parts to enhance user experience and provide intuitive navigation (Figure 6). The Tourism Map has an interactive design, allowing users to explore various tourist attractions by sliding and zooming freely. Each attraction is clickable and provides detailed explanations. The interface divides the tab bar at the bottom into five key functional areas: tasks, routes, gastronomic specialty, tourist merchandise, and personal center. The sidebar is an auxiliary information summary center, including check-in, rewards, prize redemption, and attraction overview. The researchers integrated a progress bar in the status bar to display tourists' points and travel mileage in real time. In addition, we considered the operating habits of tourists in a mobile state, especially the convenience of browsing information with a single hand. We arranged the interface's interactive elements and navigation controls in an easy-to-reach area for users to operate efficiently and quickly in a tourist environment.

Interaction design

The researchers have chosen familiar single-touch, dual-touch modes, and location-based services (LBS) to minimize user learning costs and enhance

interaction convenience. These design choices aim to achieve efficient interaction between users and the gamified digital tool (Table 1).

Table 1. The Interactive Touch Modalities and Response Mechanisms in Huizhou Cultural Tourism Gamified Digital Tools

Touch Type	Interaction Action	Logical Response Mechanism
Single-finger Touch	Single Click	The system recognizes a user's single click behavior at specific coordinates and matches it with predefined interactive elements to trigger corresponding events or information displays.
	Double Click	The system recognizes the rapid double-click behavior within the same area and activates preset functions for map zooming or detailed information display.
	Swipe	The system detects a single finger's swipe behavior and navigates the map or scrolls the interface based on the finger's movement path and speed.
Multi-finger Touch	Pinch	The system recognizes two fingers' pinch action and adjusts the map's zoom level based on their movement distance and direction.
Geofencing	Automatically Trigger	Trigger location-based interactions automatically when entering or exiting a zone.

Source: Created by the Author

Building on the previous work, the researchers completed the prototype's program development and conducted tests. The subsequent work will continue to iterate and optimize the prototype based on the feedback received. We have collected data on the impact of gamified digital tools on tourists' travel behavior and experience, which will require further analysis and reporting in subsequent research papers.

Conclusions

Gamification is an effective means to enhance tourism participation (La Cuadra et al., 2020). This study proposes a new path to combine gamification strategies with digital technologies by showing the details of the design and methods of gamification digital tools for cultural tourism in Huizhou. The application of the MDA framework to game design in cultural tourism is a first, offering a systematic methodology for the development of such projects. This study highlights the advantages of digital tools in meeting the personalized needs of younger tourists. By combining geolocation technology and real-time information services, tourists can obtain personalized recommendations and detailed explanations of attractions during the tour, enhancing the depth and quality of the tourism experience. Additionally, the combination of visual design and storytelling enhances the narrative and appeal of cultural stories.

Based on the previous user analysis, this study developed a gamification digital tool for cultural tourism based on the MDA framework, aiming to enhance the tourism participation and experience of younger tourists. Further research will concentrate on the outcomes of implementing digital gamification tools, specifically examining whether these tools foster positive attitudes and emotions among tourists, thereby enhancing their understanding of the attractions and fostering shared experiences. Suppose the results of this study can help improve the digital natives'

tourism experience. In that case, we hope to explore its wide application and long-term impact in different cultural contexts through further research and promote the sustainable development of cultural tourism.

This study also highlights some challenges and limitations of gamified digital tools in practical applications. First, finding a balance between gamified experience and authentic experience still needs further research. Second, while gamification design has the potential to enhance user engagement, further research is necessary to verify its applicability and effectiveness for various user groups.

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