

*Gamifying Taiwanese Culture:
An Interactive Approach to Promote Cultural
Understanding of Taiwan*

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Abstract

Taiwan is renowned for its rich cultural heritage and history, and the government has made concerted efforts to preserve these invaluable assets. However, the focus has predominantly been on tangible cultural heritage, leaving intangible cultural heritage, which encompasses knowledge and beliefs, relatively unaddressed. To address this challenge and aid in the preservation of Taiwanese cultural heritage, various technologies have been employed, with games emerging as the most popular medium.

This study aims to explore the advantages of utilizing games as a means to foster understanding of Taiwanese culture. Drawing on insights from a literature review and existing serious games related to the topic, we developed a prototype. Subsequently, we conducted expert interviews with professionals from the game industry and cultural creativity sector, enabling us to obtain valuable perspectives from diverse angles.

The feedback gathered from these expert interviews indicates a favorable reception of the idea of using games to educate about Taiwanese cultural heritage. Moreover, many of the suggestions provided have proven instrumental in enhancing and refining the prototype game. Ultimately, we have distilled a set of valuable guidelines for future designers aspiring to develop serious games centered around Taiwanese culture.

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person except that which appears in the citations and acknowledgements. Nor does it contain material which to a substantial extent I have submitted for the qualification for any other degree of another university or other institution of higher learning.

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Chapter 1: Introduction

Taiwan is renowned for its rich and diverse culture, which has been shaped by multiple colonization events spanning centuries. Notably, Taiwan stands out as a country dedicated to preserving traditional Chinese culture, as it continues to employ traditional Chinese characters unlike many other nations influenced by Chinese culture, which have transitioned to simplified Chinese characters akin to mainland China (Liu et al., 2016). The government of Taiwan has invested significant resources and demonstrated unwavering commitment to preserving cultural heritage within the country. However, these preservation efforts have primarily focused on tangible cultural artifacts, such as the arts and artifacts displayed in museums, as well as the restoration and protection of historical sites and architectural structures (Lu, 2017). Intangible aspect of cultural heritage on the other hand lacks such efforts for preservation.

Preserving the intangible aspects of cultural heritage, which often encompass knowledge systems and beliefs held by individuals, presents a more intricate challenge (Tan et al., 2018). Consequently, numerous individuals are earnestly striving to protect and safeguard these invaluable assets. However, many aspects of Taiwanese culture are vanishing, with languages being the most conspicuous example. Numerous Aboriginal languages in Taiwan have already become extinct, while others teeter on the brink of extinction. According to a 2017 study, the majority of Aboriginal languages in Taiwan have been classified as either extinct or critically endangered by United Nations Educational, Scientific and Cultural Organization's (UNESCO) Language Vitality Assessment (Native Language Resource Network, 2018). This assessment tool evaluates the successful transmission of a language from one generation to the next (Belew & Simpson, 2018). The remaining aboriginal languages have been categorized as severely or definitively endangered (Native Language Resource Network, 2018). This decline can be attributed, in large part, to the disinterest exhibited by younger generations in learning these languages, as they perceive limited practicality in acquiring them. Furthermore, various traditional craftsmanship skills are disappearing due to a dearth of individuals willing to undergo the rigorous training required to master these intricate crafts, compounded by the difficulty of making a sustainable livelihood solely from these specialized skills. The fundamental issue at hand is the insufficient appreciation of the value inherent in these traditional cultural practices. Therefore, raising awareness and fostering an

understanding of Taiwanese culture among the populace is of paramount importance if the preservation of these valuable assets is to be achieved (Zheng, 2019).

In addition to conventional educational approaches, such as books or lectures, innovative methods of cultural education have emerged. These include the integration of creative industries in the production of merchandise that aims to attract a broader audience, including tourists seeking to deepen their understanding of Taiwanese culture. Furthermore, a range of technologies have been implemented in cultural education. For example, museums employ immersive technologies to create augmented and virtual reality experiences for tourists. And online databases and platforms provide extensive information about Taiwanese culture.

Among the various applications of technology, games have the potential to exert a profound influence on individuals. When games are engaging and entertaining, they often attain massive popularity and capture significant media attention (Lee, 2020). However, it remains uncertain whether players engage with cultural games purely for entertainment purposes or if they genuinely comprehend the cultural significance embedded within them. This thesis delves into this subject matter and seeks to answer the research question: "What are the benefits of utilizing games for the preservation and promotion of Taiwanese culture?"

Additionally, it investigates sub-questions such as:

- Can games contribute to the preservation of Taiwanese culture?
- Can games effectively educate players about Taiwanese culture?
- Can games serve as promotional tools for Taiwanese culture?

To address these questions, this thesis will first conduct an extensive review of existing research pertaining to culture, games, and Taiwanese culture. It will also examine existing games with cultural themes, encompassing both commercial and serious games.

Subsequently, a prototype game will be designed and developed based on the insights gained from the literature review, with the explicit purpose of fostering a deeper understanding of Taiwanese culture. Expert interviews will be conducted to gain valuable perception and perspectives. Their feedback will not only aid in refining the prototype game but also contribute to a better understanding of the benefits of learning Taiwanese culture through games. The significance of this research lies not only in identifying the benefits of utilizing games in cultural education but also in providing guidance and recommendations for future designers interested in creating similar types of games.

Chapter 2: Literature Review

The literature review chapter delves into the extant research pertaining to cultural content. It commences with an explication of the meanings of culture and cultural heritage, followed by an investigation into the methods employed by people to preserve culture and the mechanisms facilitating its diffusion. Subsequently, the role of technology in enhancing cultural comprehension is elucidated, with a particular emphasis on serious and commercial games as conduits for cultural transmission. Finally, an exploration of the historical, current, and future trajectory of Taiwanese culture is conducted, underscoring its significance and the imperative of raising awareness about it.

2.1 Culture and Cultural Heritage

The term "culture" has been defined in various ways by anthropologists. While some scholars define it as learned behaviour (Spencer-Oatey & Franklin, 2012), others view culture as the material objects created by humans, such as tools and pottery (Berger, 2016). Additionally, some anthropologists assert that culture is not a physical entity, but exists solely in the mind (Quinn & Holland, 1987). Given the multitude of definitions in the field of anthropology, it can be challenging to arrive at a unified understanding of the concept. Nevertheless, during the early 20th century, there was a commonly accepted definition of culture among most researchers (White, 1959). According to Sir Edward Burnett Tylor, an eminent scholar and pioneer in the field of anthropology, culture encompasses the beliefs, customs, material objects (such as hatchets and chisels), and techniques (such as fishing and farming) of a society (Tylor & Smith, 1871). Culture is regarded as one of the most critical and valuable assets of humankind, representing the knowledge and achievements of humanity in various domains (Whatmore, 2006). The preservation and transmission of cultural heritage to future generations ensures the continuation of the knowledge and accomplishments of our ancestors. As technology continues to advance worldwide, the means and mediums of preserving cultural heritage have become increasingly diverse.

The term "Cultural Heritage" is defined by the UNESCO as the physical artifacts and intangible attributes of a society that are inherited from past generations, preserved in the present, and passed on to future generations (Kenterelidou & Galatsopoulou, 2021). The physical artifacts and intangible attributes of a society are classified as tangible cultural heritage and intangible

cultural heritage, respectively (Vecco, 2010). UNESCO defines intangible cultural heritage as practices, behaviours, knowledge, or skills that are considered part of a society's cultural heritage. Intangible cultural heritage is classified by UNESCO into five categories: oral traditions and expressions, performing arts, social practices, rituals and festive events, knowledge and practices concerning nature and the universe, and traditional craftsmanship (Scovazzi, 2015).

Tangible cultural heritage refers not only to physical objects such as artworks, artifacts, buildings, and monuments but also to non-physical practices such as music, dance, language, festivities, poetry, ceremonies, knowledge, and skills (Balela & Mundy, 2015). Distinguishing between tangible and intangible cultural heritage can be challenging at times. For example, performing arts are considered intangible cultural heritage, but music and dance can also be viewed as tangible cultural heritage. To differentiate between them further, the intangible aspects of cultural heritage can be seen as the extensive framework within which tangible aspects take shape and significance (Koch et al., 2020). For example, in the case of rituals and ceremonies, the tangible aspect is how they are performed and represented, while the intangible aspect involves the beliefs and meanings behind them.

2.1.1 Preservation of Cultural Heritage

Preserving cultural heritage is a crucial undertaking that encompasses both tangible and intangible aspects. While tangible cultural heritage, such as artworks, architecture, and monuments, can be stored in museums and galleries or conserved and restored, intangible cultural heritage, which comprises knowledge, practices, and behaviours, is carried by people and passed down through generations (Alivizatou-Barakou et al., 2017). Consequently, preserving intangible cultural heritage requires continuous learning and transmission of knowledge.

Preservation of tangible cultural heritage has historically been associated with museums and galleries, where artworks and artefacts are stored in controlled environments to reduce the rate of oxidation and extend their longevity (Yoshida, 2004; Schito & Testi, 2017). However, even with optimal preservation conditions, tangible cultural heritage still suffers from natural oxidation, especially buildings and monuments that are too large to be stored in a controlled

environment. Therefore, restoration is crucial to maintain their physical integrity and original form (De Miguel-Molina et al., 2013; Collepari, 1990).

The international community's efforts to preserve cultural heritage began with the 1954 Convention for the Protection of Cultural Property in the Event of Armed Conflict of UNESCO, which responded to the destruction and theft of historical architecture and artworks during World War II (Blake, 2000). However, international law and agreements focused mainly on tangible cultural heritage, such as buildings, monuments, and artefacts, until the Convention for the Safeguarding of the Intangible Cultural Heritage was adopted by UNESCO in 2003 (Kurin, 2004).

Preserving intangible cultural heritage is challenging as it involves passing down knowledge, practices, and beliefs that are carried by people, often with limited numbers of individuals possessing this knowledge (Cozzani et al., 2017). For instance, language spoken by minority groups can become extinct as a more dominant language replaces it. Research suggests that over 60% of the world's languages are at risk of extinction in the next 100 years (Romaine, 2007). This further underscores the criticality and significance of safeguarding intangible cultural heritage.

Preserving cultural heritage is crucial not only from a historical and ethical perspective, but also for tourism purposes. Tuan and Navrud (2008) conducted a study on the “My Son” cultural heritage site located in Vietnam. This site is known for its ancient Hindu temples and artifacts, which is a unique feature as most of the temples in Vietnam are dedicated to Buddhism (Tuan & Navrud, 2008). In 1999, My Son was recognized as a UNESCO World Heritage Site, and it is considered an important symbol of Vietnam's cultural and religious history. The authors estimated that restoring My Son's cultural heritage would lead to a significant increase in tourism revenue for Vietnam, catering to both domestic and foreign tourists.

In summary, preserving cultural heritage is crucial for passing down knowledge, history, and practices to future generations. While tangible cultural heritage is often preserved through museums, galleries, conservation, and restoration, preserving intangible cultural heritage requires ongoing learning and transmission of knowledge, which poses unique challenges.

Nonetheless, the preservation of cultural heritage is not only essential for historical and ethical reasons but also has the potential to bring significant economic benefits.

2.1.2 Spreading and Transition of Culture

Intangible cultural heritage encompasses the practices, skills, and beliefs that are passed down from generation to generation within a particular community (UNESCO, 2009). As the community grows and expands, the culture has the potential to thrive. However, when groups of people interact with one another, intangible cultural heritage may merge and eventually become extinct. In recent years, there has been a growing awareness of the value of traditional culture, leading to efforts to preserve intangible cultural heritage through mainstream media or tourist resources to share these unique cultural traditions with the world.

When groups of people migrate to new places, they bring with them their intangible cultural heritage. This phenomenon can be seen in the example of Chinese cuisine, which has been carried to new regions around the world, resulting in the establishment of authentic Chinese restaurants in the USA, UK, Japan, and elsewhere (Cho, 2010). However, in some cases, a dominant culture may replace a minority culture. For example, the traditional dress in Chinese culture, the cheongsam, is becoming less common as Western-style clothing gains popularity, leading to the loss of craftsmanship and tailoring skills passed down from generation to generation (Wei, 2013). Numerous invaluable cultural elements are eroded through these processes, underscoring the utmost significance of preserving cultural heritage.

Leo Frobenius proposed the theory of trans-cultural diffusion or cultural diffusion in 1897 to explain how cultures transition over time. The theory identifies five types of cultural diffusion: expansion diffusion, relocation diffusion, hierarchical diffusion, contagious diffusion, and stimulus diffusion (Sylvain, 1996). Expansion diffusion refers to a stronger or dominant culture remaining in its original area while also spreading to other regions, such as the Japanese street food Takoyaki, which originated in the Osaka region and is now found throughout Japan. Relocation diffusion refers to cultural practices, skills, and beliefs that are carried to different places through migration. Hierarchical diffusion refers to cultural practices that are spread within society from influential figures to the general public. Contagious diffusion is a form of cultural diffusion that spreads person-to-person, similar to the spread of infectious diseases. Finally, stimulus diffusion occurs when cultural practices are transformed or altered as they are

spread, as can be seen in the adoption of Southeast Asian ingredients into Chinese cuisine, resulting in Nyonya cuisine, when Chinese immigrants settled in Malaysia.

While the diffusion of culture can allow for the expansion and adoption of superior cultures, it may also cause the replacement of minority cultures. According to Headland (2003), nearly 7,000 active languages were spoken in the early 2000s, but many of them, spoken by minority groups, are becoming extinct at a rate of at least two languages per month. This again highlights the significance of preserving cultural heritage (Headland, 2003).

2.2 Technology and Cultural Learning

Technology has provided significant opportunities for cultural learning, allowing people to learn about various cultures and traditions worldwide. Cultural learning through technology can occur in various forms, including games, mobile applications, and virtual reality environments.

Games are an effective means of teaching people about different cultures. Educational games that incorporate cultural elements help players learn about cultural practices, beliefs, and traditions while having fun (Shi & Shih, 2015). For example, the game "Never Alone" teaches players about the traditional beliefs and folklore of the Iñupiaq people of Alaska. The game was developed in collaboration with the Alaska Native community and features authentic stories and characters from Iñupiaq culture (Ravenscroft et al., 2017). There are numerous games that serve as tools for preserving cultural heritage.

Mobile applications can also be effective in promoting cultural learning. Applications that include language learning, recipes, and cultural events can be downloaded and accessed easily by people worldwide. For example, the application "Duolingo" provides language learning in various languages and cultural contexts, such as Spanish and Latin American culture, French and French culture, and Japanese and Japanese culture (Nushi & Egbali, 2017). The application "Culture Trip" provides information about local cultural events and locations worldwide, including museums, cultural festivals, and historical sites (Huang & Guo, 2020).

Virtual reality (VR) is an immersive technology that provides a unique opportunity for cultural learning. VR environments can simulate historical events, landmarks, and cultural experiences, providing users with an immersive learning experience. For example, the VR application

"VersaillesVR - The Palace is Yours" allows users to explore the Palace of Versailles in France and learn about the history and culture of the French court (Weber-Sabil & Han, 2021). Similarly, "Minecraft: Education Edition" - allows users to explore and learn about various cultures from around the world, including ancient civilizations and indigenous communities (Kuhn, 2018).

In addition to games, mobile applications, and VR environments, technology can also facilitate cultural learning through social media platforms. Social media platforms such as Instagram, Facebook, and Twitter can be used to share cultural information, including art, music, and fashion, among others. Users can follow cultural influencers, artists, musicians, and fashion designers worldwide, learn about their work, and gain insight into their cultural practices (Suh, 2020).

Overall, technology has provided significant opportunities for cultural learning, allowing people worldwide to learn about diverse cultures and traditions. Technology-enhanced learning, educational games, mobile applications, VR environments, and social media platforms are effective means of promoting cultural learning.

2.2.1 Technology-Enhanced Learning

Technology-enhanced learning refers to the use of technology in education to improve the learning experience for both students and teachers (Balacheff et al., 2009). Since the introduction of the enhanced learning concept, technology has been employed to facilitate the teaching and learning of various subjects, including sciences, arts, culture, and languages. The outbreak of the Covid-19 pandemic in 2019 forced many students to study from home, resulting in widespread adoption of internet-based streaming technologies by schools and universities (Chen et al., 2021). Virtual classrooms, such as those created using Google Meets, Zoom, and Microsoft Teams, enable real-time interaction between teachers and students, who can participate using internet-connected devices such as computers, tablets, and mobile phones.

Interactive technology, such as games and mobile applications, is also increasingly used to enhance the learning experience (Petty, 2013). Digital formats offer a wide variety of content, including vivid and stimulating visuals and audio, which can help engage students in learning (Nicolaou et al., 2019). By interacting with games and applications, students have more

opportunities to practice and teachers can more easily assess their learning outcomes. This format also enables students to learn at their own pace, creating a sense of responsibility for their own learning (Klisch et al., 2012).

Technology-enhanced learning has enabled the design of educational applications and games for subjects that rely on experiences that text alone cannot convey. For example, cultural heritage sites and artifacts can be difficult to describe adequately using only text or pictures. However, applications that present these objects in 3D environments allow users to examine details and experience the scale of the site from different perspectives (Lackovic et al., 2015).

Immersive technology, including augmented reality, virtual reality, and mixed reality, has also become increasingly prevalent in supporting education. These technologies blur the boundary between virtual and physical worlds, providing an immersive experience for the user (Suh & Prophet, 2018). Immersive technology has been employed to enhance learning in various fields, including healthcare (Mathew & Pillai, 2020), vocational training (Zinnatova, 2021), language (Blyth, 2018), and culture (Shih, 2015).

One early example of immersive technology in cultural learning is the "Walk through Ancient Olympia" virtual reality museum, which allows users to experience life in ancient Greece during the time of the Olympic Games. Visitors can explore cultural heritage sites, learn about rituals and sports competitions, and experience the environment in 3D (Gaitatzes et al., 2005). Another example is an English learning platform that combines real-life street information and photos from Google Street View with the VR interactive environment provided by Blue Mars Lite. Students can practice English while walking along the river Thames in London and visiting places like the Tower of London, Buckingham Palace, and London Bridge. This approach enhances language and culture learning and promotes student interest in these subjects (Shih, 2015).

Technology-enhanced learning provides a more engaging and interactive educational experience through the use of visual and audio materials. Digital formats and internet connectivity also make education more convenient and accessible to students. Consequently, many educators endeavour to incorporate technology into their teaching practices.

2.2.2 Game as Learning Tool

Numerous opinions exist with respect to the elements that make up a game, including goals, mechanisms, interaction, theme, narrative, and art design (Shi & Shih, 2015; Liu et al., 2022). Nevertheless, when considering the factors of an educational game, those that support the player's learning experience are of utmost importance. These factors comprise goals, interaction, and feedback (Paras, 2005). Typically, the goal of a game involves solving a puzzle, defeating an enemy, or reaching a specific location. Conversely, the goal of an educational game is to facilitate the player's learning. Thus, it is vital to align the educational objective with the game itself to enable the player to learn or practice by completing the goal within the game (Shelton & Scoresby, 2011). As such, puzzle games have emerged as the most popular genre within educational games, given that game designers can readily convert an educational problem into the game's objective.

Interactivity stands as one of the foremost crucial elements in educational games, encompassing the manner in which players engage and interact with the game (Sicart, 2008). For instance, in a classic third-person game, players employ a controller to guide the main character, who subsequently interacts with non-playable characters, game objects, and the environment. User interface also forms part of the interaction in games. Given that interaction is the means through which players immerse themselves and engage with the game, it is crucial to integrate learning content via interaction (Tillmann et al., 2013). If players can only learn passively, such as by reading text or watching a cutscene, the educational benefits of playing games are diminished. An exemplary case in point is FakeMuse, a game that involves identifying forgeries of art pieces, where players assume the role of an appraiser and must scrutinize artwork to detect flaws (Zilio, 2021). This game illustrates learning through play and interaction.

Feedback holds great significance in educational games, as it directly relates to the player's sense of accomplishment. It encompasses the information or response that players receive upon successfully achieving a goal within the game (Gee, 2005). In a roleplaying game, players gain experience points and level up upon completing quests or obtain more potent weapons upon discovering treasure chests. In a puzzle game, the feedback is the satisfaction of finding a solution. In competitive games, such as fighting games, the feedback is the defeat of one's opponent, akin to the outcome of a sporting competition. Feedback is the means of keeping

players engaged and interested in replaying the game until achieving the final goal. Thus, providing clear feedback that piques the player's interest is paramount if designers wish to deliver a long-term educational learning experience (Gee, 2005).

Quantifying the balance between educational content and entertainment in games poses a challenge. However, it remains crucial to establish a connection between the fundamental elements of a game and the educational content that players are meant to acquire. In the context of this research, the challenge lies in devising methods to enable players to simultaneously learn about cultural heritage and derive enjoyment from the game's entertainment aspects.

2.2.3 Commercial and Serious Games for Cultural Learning

Games are commonly used for cultural learning, including both commercial and serious games that use various elements of culture (Liu et al., 2022). Commercial games are designed primarily for entertainment and may encompass a wide range of genres, such as fantasy, science fiction, historical, and mythological (Heintz & Law, 2015). However, games that are based on historical events or periods often have a strong cultural connection (Rochat, 2019). One example of such a game is *Age of Empire II: The Age of Kings* (Microsoft, 1999), a strategic game that features numerous historic wars, including the Mongolian invasion, the crusades, and the war led by Joan of Arc. Players can learn about various cultural aspects of medieval Europe, including agriculture, architecture, spinning and weaving, and military strategy. *Assassin's Creed II* (Ubisoft, 2009) is an action game set in the Renaissance period in Italy, with Florence and Venice recreated as game settings. The game provides a learning opportunity about the culture of Italy during that time. The characters' outfits are designed based on historical materials, and the buildings and landscapes are recreated with historical accuracy (Menon, 2015). Another example is *Sid Meier's Civilization VI* (2K Games, 2016), a strategic game that explores the development of human civilization. Players make decisions that shape human development from the stone age to the modern era, gaining knowledge about various cultural aspects of many civilizations throughout this process.



Figure 1 A Screenshot of Assassin's Creed II Showing the Canal of Venice (Ubisoft, 2009)

There exist numerous games that are designed to showcase the culture of the modern era. *Taiko no Tatsujin: The Drum Master!* (Bandai Namco Entertainment, 2022) is the latest edition in the Taiko no Tatsujin series, a rhythm game in which the Taiko, a traditional Japanese drum, is the primary instrument. The music tracks in the game mainly comprise Japanese songs, including pop music, anime themes, folk music, and more. The game's visuals are related to the events and rituals of Japanese festivals, further reinforcing cultural connections (Oliva, 2019). *Yakuza Kiwami* (SEGA, 2019) is a game that depicts the criminal society of modern Japan, featuring Japanese criminal association culture, tattoo culture, and sex establishment culture, which are not easily accessible to ordinary tourists. The example games presented offer players a distinct cultural learning experience as they engage in gameplay.



Figure 2 Screenshot of *Taiko no Tatsujin: The Drum Master!* with Japan Visual Elements
(Bandai Namco Entertainment, 2022)

In contrast to commercial games, serious games refer to games that serve a purpose beyond entertainment, such as education, social impact, or exercise and health (Laamarti et al., 2014). Among serious games, educational games are the most prevalent type. Designers and educators have developed games that can be utilised to teach various subjects, skills, or practices, including science, mathematics, languages, history, culture, and more (Tseklevs et al., 2016).

Numerous successful examples of serious games used to facilitate education can be identified. For example, *Relive* is a serious game designed to teach children and adolescents about cardiopulmonary resuscitation (CPR) techniques and skills (Semeraro, 2017). *Make A Cup of Tea* is a game intended to assist caregivers of individuals with dementia by offering messages and recommendations to help them comprehend the condition and foster empathy (Liu et al., 2018). Additionally, *FakeMuse* is a game focused on the forgery of artifacts, in which players assume the role of a museum curator and must inspect various artifacts to determine their authenticity or fraudulent nature (Zilio, 2021).

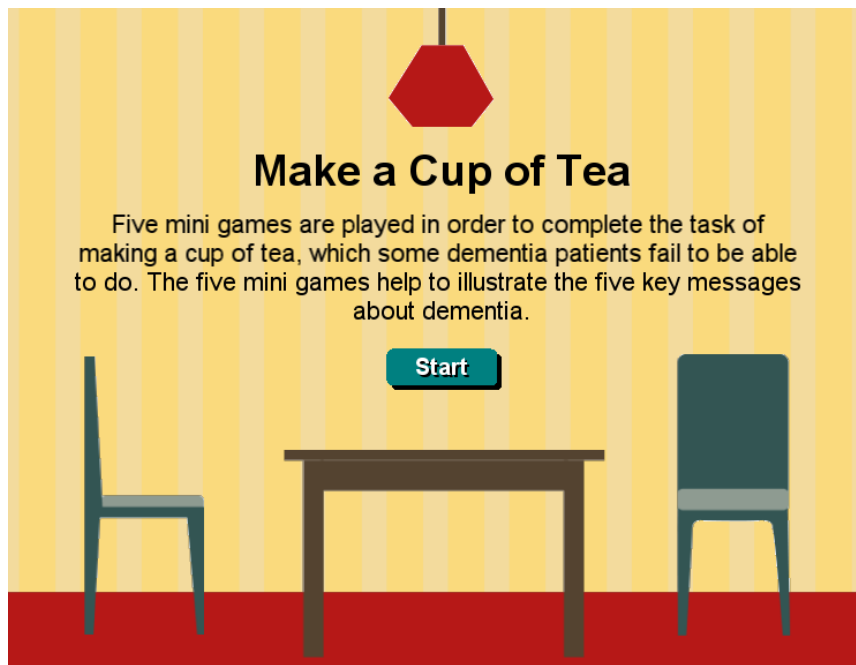


Figure 3 A Screenshot of Dementia Supporting Game: Make A Cup of Tea (Liu, 2018)

Despite the primary objective of commercial games being entertainment, their themes provide players with an opportunity to gain insights into cultures of both past and present times, potentially resulting in a cultural learning experience without the player even realizing it. Furthermore, there is an abundance of serious games designed for cultural learning, which offer the added benefits of ease of delivery, increased engagement, and interaction. As a result, serious games have emerged as a trend for delivering cultural learning experiences.

2.2.4 Genres and Platforms of Serious Games for Cultural Education

Serious games designed for cultural education are versatile in their platform distribution, with versions available for PC, Mac, mobile phones, tablets, and virtual reality head-mounted displays. Mobile apps are the most commonly employed format due to their convenience and accessibility to users. The lower development barrier of mobile apps compared to PC or VR platforms is a significant advantage. Additionally, children, the primary audience for these games, are more familiar with mobile devices as parents now tend to introduce them at an early age. Moreover, mobile apps are capable of running on hundreds of phone and tablet models. However, the hardware limitations of mobile phones pose challenges when developing 3D games.

The primary purpose of serious games is to impart knowledge; consequently, puzzle games are the most common genre used to develop them. The most basic form of a serious game involves interactive play where the player selects an answer to a question and is rewarded for correct answers. Some serious games incorporate gameplay elements into the theme, such as *A Cup of Tea*, which aims to support dementia caregivers. The game employs gameplay mechanics to enable players to experience dementia symptoms, such as disorientation to time and place (Liu et al., 2018). Though there exist numerous examples of serious games, most fall into the puzzle game genre. Please refer to Table 1 for further details.

Table 1 *Examples of Serious in the Puzzle Game Genre*

Games	Purpose	Genres	Reference
A Cup of Tea	To support the carer and family of dementia patients.	Puzzle	Liu, 2018
Cathkids	To teach children about the knowledge of Catholicism.	Puzzle	Sulistiyo et al., 2019
MAtHE	To teach children how to distinguish fake and real news information.	Puzzle	Katsaounidou et al., 2019
Riskio	To raise the awareness of the cyber security and education	Puzzle	Hart et al., 2020
Communicate!	To teach the skill of communication.	Puzzle, Role Playing	Jeuring et al., 2015

2.3 Taiwanese Cultural Heritage

Taiwan is a country with a rich and multifaceted tangible and intangible cultural heritage that has been influenced by various colonial powers throughout its history. The Dutch and Spanish colonies, the Kingdom of Tungning, the Qing dynasty, the Japanese Empire, and the Republic of China have all left a mark on Taiwan's culture, resulting in a diverse and fascinating cultural milieu. Taiwanese people have inherited architectural landmarks, religious beliefs, and cultural practices from these different periods. Religion, in particular, has played a significant role in the daily lives of Taiwanese people, and the influence of Christianity, Taoism, and Buddhism can still be observed today. Taiwan has gone through several periods of assimilation and recognition of cultural diversity. After being reintegrated into China after World War II, non-

Chinese cultures were suppressed, but after the lifting of Martial Law in 1987, Taiwan acknowledged and celebrated its diverse cultural heritage. Taiwan remains an open and welcoming society that embraces new cultural traditions. However, traditional Taiwanese culture faces significant challenges, including the loss of many intangible cultural elements. This includes the loss of mother languages among the aboriginal population, traditional cuisines such as Tshiú-lōo-tshài(手路菜), and traditional religious practices.

2.3.1 Historical and the Present Scenario

Taiwan is a country renowned for its multicultural character, having been under the colonization of several nations throughout its history. Its historical timeline can be segmented into five distinct eras, namely, the Dutch and Spanish colonies (1624-1668), the Kingdom of Tungning (1661-1683), the Qing dynasty (1683-1895), the Japanese Empire (1895-1945), and the Republic of China (1945-present) (Rubinstein, 2015). The amalgamation of these diverse and contrasting political regimes has led to the emergence of a rich and multifaceted cultural milieu in Taiwan.

Numerous historical architectural landmarks, including fortresses and outposts built by Dutch and Spanish colonizers, have persevered to this day. The advent of Christianity by these early colonizers has had a profound impact on the indigenous communities in Taiwan, with Christianity continuing to exert a significant influence on contemporary indigenous cultures. The appellation of "Formosa," bestowed by European mariners in the seventeenth century, signifying "beautiful" in Latin, has endured for over three centuries as a reminder of Taiwan's captivating beauty (Tseng, 2017).

During the periods of Kingdom of Tungning and Qing dynasty, Taiwan witnessed a substantial influx of migrants from Fujian and Guangdong provinces in China, numbering in the millions. As a result, Chinese culture, including language, food, clothing, and religious practices, became the predominant cultural milieu in Taiwan (Hung, 2015). Religious culture played a crucial role in the daily lives of Taiwanese people, given the harsh living conditions during this era. For instance, the Goddess of Sea, Mazu, was widely venerated by those who safely navigated the treacherous Taiwan Strait, and temples dedicated to various gods and goddesses from their homelands were constructed by the immigrant communities. These temples served as a gathering place for people and contributed to the development of local commerce, such as street

food vendors. Even today, temples continue to serve as hubs for both Chinese religious practices and commercial activities in Taiwan.

Following China's defeat in the First Sino-Japanese War, Taiwan was incorporated into the Japanese Empire's sphere of influence in 1895. At the time, Japan was undergoing the New Cultural Movement, and as such, the influence of western culture was more pronounced in Taiwan than Japanese culture. The Japanese administration implemented measures to improve public health and education, such as the construction of modern hospitals and schools. Additionally, the establishment of railroads and ports facilitated both domestic and international commercial trade (Wang, 2015). The Japanization Movement was also introduced to Taiwan in preparation for World War II, compelling Taiwanese citizens to assimilate to Japanese culture, language, and religion (Peng & Chu, 2017). Although the Japanization Movement was short-lived, some elderly Taiwanese can still speak Japanese fluently today. Furthermore, several Japanese shrines from the era remain and have become popular tourist attractions. The Japan Colonization period marked a critical juncture in Taiwan's history, as it was during this time that the Taiwanese became acclimated to the new cultural milieu.

Following World War II, Taiwan was reintegrated into China. During the early stages of reunification, the government attempted to eradicate non - Chinese cultures. Japanese shrines and churches were destroyed, and the use of languages other than Mandarin was prohibited in public spaces. However, after the lifting of Martial Law in 1987, traditional and local cultures were once again acknowledged and celebrated. History and social science courses in schools now include teachings on the various cultures of Taiwan. The Government has also encouraged aboriginal tribes to learn and preserve their mother language. Additionally, media outlets such as movies, plays, and games have embraced multiple aspects of Taiwanese culture as their thematic foundation.

Taiwan's history has endowed the island with a rich tapestry of diverse cultures, including Aboriginal, Chinese, Western, Japanese cultures and more. Today, Taiwan remains an open and welcoming society, receptive to the influence of new cultural traditions. Local television channels broadcast programs and movies from around the world, exemplifying Taiwan's eagerness to embrace new cultural experiences. A multitude of culinary options are also

available, ranging from Chinese and Taiwanese cuisine to Western, Indian, and Korean fare, all conveniently located in a single food court.

As with cultures throughout the world, traditional Taiwanese culture faces significant challenges, including the loss of many intangible cultural elements. Despite Taiwan's nearly 600,000 aboriginal population, the vast majority have not inherited their mother language from previous generations. According to a 2017 study, the majority of aboriginal languages in Taiwan have been rated as either extinct or critically endangered by UNESCO's Language Vitality Assessment, a tool used to evaluate whether a language is being successfully transmitted from one generation to the next. The remaining aboriginal languages have been rated as either severely endangered or definitively endangered (Native Language Resource Network, 2018).

Traditional cultures in Taiwan are facing significant challenges that put them at risk of being lost. For instance, Tshiú-lōo-tshài, the complex and time-consuming traditional cuisine of Taiwan, is no longer attracting young people who are more interested in foreign cuisines such as Italian, French, and Japanese. Consequently, the knowledge and skills required to prepare Tshiú-lōo-tshài are at risk of being lost. In addition to this, traditional religious practices in Taiwan, particularly Taoism, which has the largest following, are also facing challenges. Although the rituals and customs associated with the worship of ancestors are typically passed down from parents to children, many people do not fully understand their meaning. As a result, Taiwanese often follow their parents' religious practices without a comprehensive understanding of their significance.

2.3.2 Game for Learning Taiwanese Cultural Heritage

In order to enhance the appreciation of traditional culture among the Taiwanese populace, it is imperative to merge it with the prevailing trends and disseminate it in a manner that is highly sought-after. As such, this research endeavours to construct a game that takes the form of a social media platform, emulating the most prevalent social media applications in Taiwan, including Facebook and Instagram.

In Taiwan, the popularity of social media has steadily risen since the Chinese version of Facebook was introduced in 2008. Currently, social media platforms have become an integral

part of everyday life for Taiwanese individuals. Politicians employ social media channels to engage with their constituents, promote their ideas, and even launch attacks on their opponents. Influencers utilize these platforms to share their experiences with various products, visiting tourist attractions, and indulging in unique culinary experiences. Additionally, ordinary citizens frequently use these platforms to share personal anecdotes and engage with their social circles online. As a result, many individuals in Taiwan spend considerable amounts of time scrolling through Facebook and Instagram on a daily basis (Lin, 2017).

There are several potential advantages to developing a game that is modelled after a social media platform. Firstly, players will be already familiar with the layout, even if they have never played a game before. As social media platforms have become an integral part of daily life in Taiwan, people of all ages, ranging from young children to the elderly, have experience using such platforms. Secondly, incorporating the game within existing social networks would allow for easy sharing and dissemination, potentially leading to the game going viral. Thirdly, social media posts typically consist of an image, a description, and a location, making them a suitable vehicle for delivering cultural content that is connected to our everyday lives. By consistently featuring cultural elements, such as local cuisine or tourist attractions, players may be encouraged to experience these aspects of traditional culture in real life.

2.4 Summary

The preservation of cultural heritage is a crucial task as it constitutes the inheritance of human civilization. Tangible cultural heritage can be conserved through museum collections and restoration efforts (Schito & Testi, 2017; Alivizatou-Barakou et al., 2017), whereas safeguarding intangible cultural heritage presents a more complex challenge. The promotion of intangible cultural heritage is essential to enable wider access to cultural knowledge (Cozzani et al., 2017). Technology has been introduced as a new format for cultural learning experiences to help more people understand and appreciate culture.

The integration of technology with cultural promotion provides a more interactive and immersive learning experience. Video games, which initially served only as a means of entertainment, have now emerged as a popular educational tool. Commercial and serious games have proven to be effective in promoting cultural learning experiences, leveraging their ability to provide rich visual and audio content and interaction, which aid in cultural retention.

To promote the diverse and rich culture of Taiwan, this study aims to design a game that effectively delivers a wide range of Taiwanese cultural content, relevant to people's everyday lives. In the subsequent section, we will discuss the methodology employed to design and develop the cultural game for this research.

Chapter 3: Methodology

This chapter examines numerous game design frameworks implemented and discussed by other researchers. This research study adopts Andreoli's (2017) flexible framework which consists of four distinct phases: Preliminary, Conceptual, Development, and Evaluation (Andreoli et al., 2017). The framework was used to include important cultural messages in the game's design, resulting in the development of the research game. Additionally, the employment of the user interface (UI) design tool "Figma" to craft the game's prototype is discussed, along with plans to employ expert interviews for game evaluation.

3.1 Framework for Designing Games

Numerous frameworks for designing serious games have been proposed by researchers and designers. Mitgutsch (2012) developed a framework that serves as an assessment tool for serious games, based on their intended purpose (Mitgutsch & Alvarado, 2012). Similarly, Olszewski (2017) created a framework specifically for designing serious games in the domain of medical education (Olszewski & Wolbrink, 2017). Tsikinas (2020) developed a framework aimed at designing serious games for individuals with intellectual disabilities (Tsikinas & Xinogalos, 2020). Other frameworks include those proposed by Boyle and Connolly (2018) that incorporate game-based learning principles, the use of data analytics, and stakeholder engagement (Boyle & Connolly, 2018), and Kato's (2010) framework that incorporates game mechanics, narrative elements, and educational content, aimed at enhancing player engagement and learning outcomes (Kato, 2010). Wouters et al. (2013) proposed a framework that considers the learner's cognitive and affective states, the game's learning objectives, and feedback mechanisms (Wouters et al., 2013). Deterding et al. (2011) developed a framework based on game design principles, pedagogy, and psychology (Deterding et al., 2011). These frameworks provide valuable guidance to game designers in creating serious games that meet specific goals and cater to the needs of diverse audiences.

Table 2 *Several Frameworks of Serious Game Design*

Research Title	Introduction of the Framework	Reference
Purposeful by design? A serious game design assessment framework	The framework aims to provide a structured approach to evaluating the effectiveness of serious games in achieving their intended outcomes.	Mitgutsch & Alvarado, 2012

Serious gaming in medical education: a proposed structured framework for game development	The framework serves as a structured approach for the development of serious games that aim to teach medical-related content effectively.	Olszewski & Wolbrink, 2017
Towards a serious games design framework for people with intellectual disability or autism spectrum disorder	A framework for the design of serious games tailored to individuals with intellectual disabilities or autism spectrum disorder.	Tsikinas & Xinogalos, 2020
A review of the value of using games and gamification to enhance learning and assessment	A framework for designing educational games that leverage the benefits of game-based learning while utilizing data analytics to measure learning outcomes. Moreover, the inclusion of stakeholder engagement ensures that the resulting games meet the needs and preferences of the intended audience.	Boyle & Connolly, 2018
Video games in health care: Closing the gap	A framework that integrates game mechanics, narrative elements, and educational content to enhance player engagement and learning outcomes in the healthcare field	Kato, 2010
A meta-analysis of the cognitive and motivational effects of serious games	A framework that takes into account the learner's cognitive and affective states, the game's learning objectives, and feedback mechanisms.	Wouters et al., 2013
From game design elements to gamefulness: Defining "Gamification."	This study proposes a framework that is grounded in game design principles, pedagogy, and psychology.	Deterding et al., 2011

The significance of these frameworks lies in their emphasis on key factors, such as learning objectives, player engagement, and feedback mechanisms, when designing serious games. By offering guidance on how to incorporate these factors into game design, these frameworks help designers to create effective and engaging serious games that achieve specific goals.

Due to the broad and complex nature of culture, this research requires a flexible framework that enables the exploration of various aspects of cultural content in game design. The framework should allow for adjustments throughout the design and development process and facilitate the creation of prototypes for efficient evaluation. Therefore, the current study will adopt Andreoli's (2017) design framework, specifically designed for cultural heritage games. This framework

comprises four phases, including the Preliminary, Conceptual, Development, and Evaluation phases, as illustrated in Figure 4 (Andreoli et al., 2017). By utilizing this framework, the researchers can create culturally rich and engaging games while also considering the effectiveness of the game in achieving its intended outcomes. The research objectives focus on exploring potential content for developing a serious game with regards to Taiwanese culture. In lieu of producing a final product, the study adopts a cyclical approach of concept development and evaluation. As game design is a continuous and evolving process, the iterative nature of the four phases furnishes a flexible workflow for the design and development of the research game.

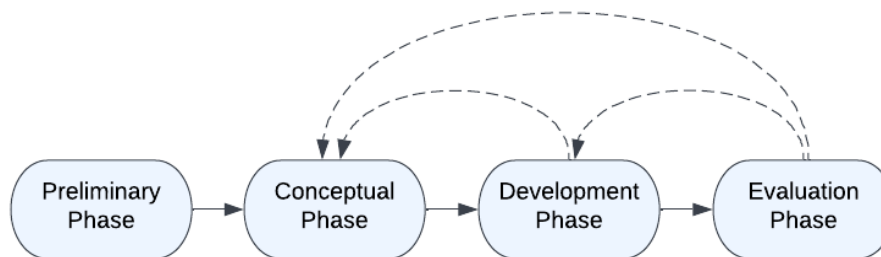


Figure 4 Four Phases Framework for Design, Development and Evaluation a Cultural Heritage Game (Andreoli et al., 2017)

In the preliminary phase, designers should carefully consider and determine the fundamental information of the game, including its purpose, learning content, platform, and target audience. These decisions are critical and should not be altered as they will significantly affect the game's concept. For this study, the purpose of the research game is to educate people about Taiwanese culture, and the target audience includes all individuals in Taiwan, regardless of their gaming experience. These fundamental concepts will influence how the concept of the game is formulated in the subsequent phase.

In the conceptual phase, the game's content and elements are generated through brainstorming. These may include characters, themes, mechanics, systems, narrative, visual and audio design, gameplay, and game goals. Which elements are critical to the game depend on the purpose and target audience decided in the preliminary phase. Also, key questions relating to the research game include how to broaden its appeal to a wider audience, how to effectively deliver the cultural content, and how to provide feedback to maintain player interest.

In the development phase, the prototype or final product is created, including programming, art design, audio design, and narrative script. During this phase, designers continually re-examine the ideas generated in the conceptual phase to address challenges encountered during development. For example, developing a 3D game for mobile devices is more challenging than developing a 2D game due to the vast range of mobile phone models and the hardware limitations of lower-end devices. If designers encounter this issue early in development, they may choose to redesign the game as a 2D product. This would reduce the workload for both programming and art design, freeing up more resources to focus on content critical to the game's purpose.

In the evaluation phase, the prototype or early build of the game is tested by gamers or industry experts. The game may undergo multiple rounds of evaluation and development to resolve technical issues and improve game flow. If the game receives significant negative feedback, it may return to the conceptual phase for further revisions. Given that the research game will be presented as a rough prototype lacking visual and audio design, expert interviews will be conducted to provide feedback on the core content of the game, namely Taiwanese cultural heritage. This approach allows for greater focus on the game's essential aspects while ignoring potential distractions from its visual appearance.

3.2 Adopting the Framework

This section aims to elucidate the adoption of Andreoli's (2017) framework consisting of four phases and how each phase has been implemented in the design of the research game (Andreoli et al., 2017). And explain how the prototype game were design through each phase.

Andreoli's (2017) framework is divided into four phases: preliminary, conceptual, developmental, and evaluation (Andreoli et al., 2017). The preliminary phase is the foundation of the framework, where the research topic is selected, and the literature review is conducted to understand the research problem. The conceptual phase is where the game concept is established, and the core game mechanics and game elements are designed. The developmental phase is the implementation phase, where the game design is refined, and the game prototype is created. Finally, the evaluation phase assesses the game's effectiveness, user experience, and overall design.

In designing game for this research study, the preliminary phase involved selecting the research topic of cultural heritage education and conducting a literature review to understand the problem better. In the conceptual phase, the game concept was established, and the core game mechanics, user interface, workflow, and game content were designed. In the developmental phase, the design was refined, and a prototype was created using Figma. Finally, in the evaluation phase, qualitative interviews were conducted with experts from both the cultural and game industries to assess the effectiveness of the game's design. Thus, by adopting Andreoli's framework, our research game design process was guided systematically, allowing us to effectively address each phase of the framework to create a successful cultural heritage education game.

3.2.1 Preliminary Phase

The initial phase of the research game design involves determining the core concept of the game. This phase serves as a foundation that guides and inspires the researcher in shaping various game elements such as gameplay, content, platform, and mechanics. The conceptualisation process is centred on three crucial questions that relate to the three key game factors outlined in the literature review section, namely, goal, interaction, and feedback (Paras, 2005).

To arrive at a game concept, the researcher addresses the three questions that pertain to the key game factors as illustrated in Figure 5. The questions are as follows: How can the game reach a wider audience, including non-gamers? In what form should the cultural content be delivered? How can the game provide feedback that maintains player interest?

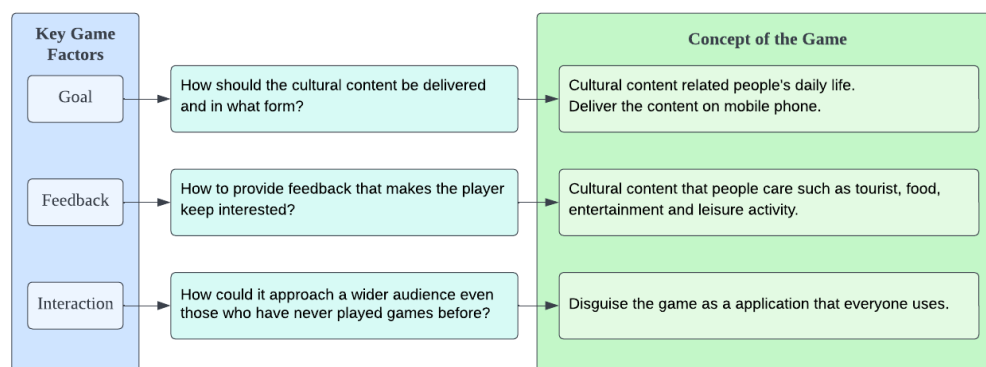


Figure 5 Developing Game Concept of the Research Game

Through answering the three questions, the research game has taken the form of a social media platform due to its ubiquitous nature among Taiwanese individuals (Lin, 2017). Consequently, the cultural content is delivered through posts on a social media network, thereby allowing for a diverse range of cultural categories to be presented. Such content may include a post about a popular street food in the night market that has existed for over a century, a religious activity that attracts millions of pilgrims each year, or instructions for making a traditional paper umbrella through a do-it-yourself (DIY) activity. These cultural activities are often associated with people's daily lives and leisure time (Inglis, 2004). As individuals peruse the social media posts containing information about Taiwanese cultural heritage, they may reflect on their personal experiences or follow a particular trend (Hsu, 2019). For instance, if an individual observes a post about a restaurant that comes highly recommended, they may be inclined to try it for themselves. Ideally, the game's content could be readily shared with a real social media platform like Facebook or Instagram due to its similar layout.

3.2.2 Conceptual Phase

During the conceptual phase, the researcher undertakes the task of designing the fundamental components of the research game, in accordance with the core concept established in the preliminary phase. These components include the user UI layout, workflow, game content, and mechanics, among others.

The central aim of the game is to develop a cultural heritage game that closely resembles a popular social media platform. Specifically, the researcher takes inspiration from Instagram, a well-known photo-oriented platform that enjoys wide usage in Taiwan. Notably, in the research game, each post lacks a crucial piece of information, such as location or descriptive text, thus transforming it into a quiz. Each quiz is accompanied by four possible options, presented alongside corresponding checkboxes, from which players may select their answer.

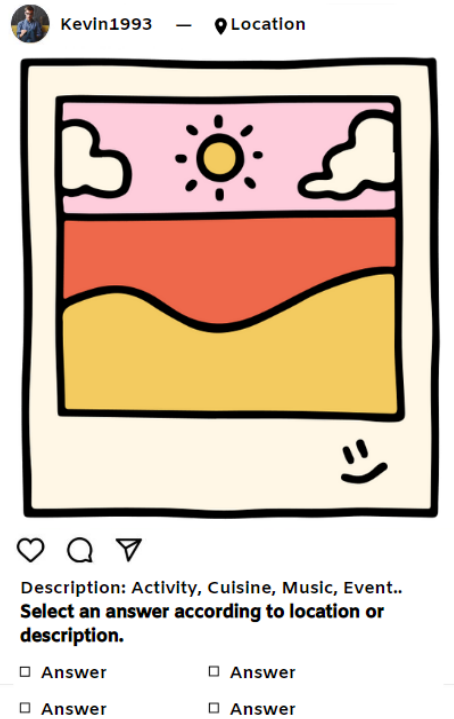


Figure 6 User Interface Layout of the Research Game

The cultural content of the game is presented in the form of a social media post that mimics daily life scenarios. It comprises three essential elements: an attention-grabbing picture, a casual description of the cultural heritage, and its location. The description, however, is not presented in a formal or lecturing tone; instead, it adopts a conversational tone to simulate an ordinary person's social media post. The location information provides a linkage between the virtual game and real-life scenarios, as players can visit the locations, they find interesting. To ensure an interactive and engaging experience that requires player participation, a keyword in either the description or location is missing, and the player must choose the correct answer from four options presented as depicted in Figure 7. This approach facilitates memorization and retention of key information through interaction.

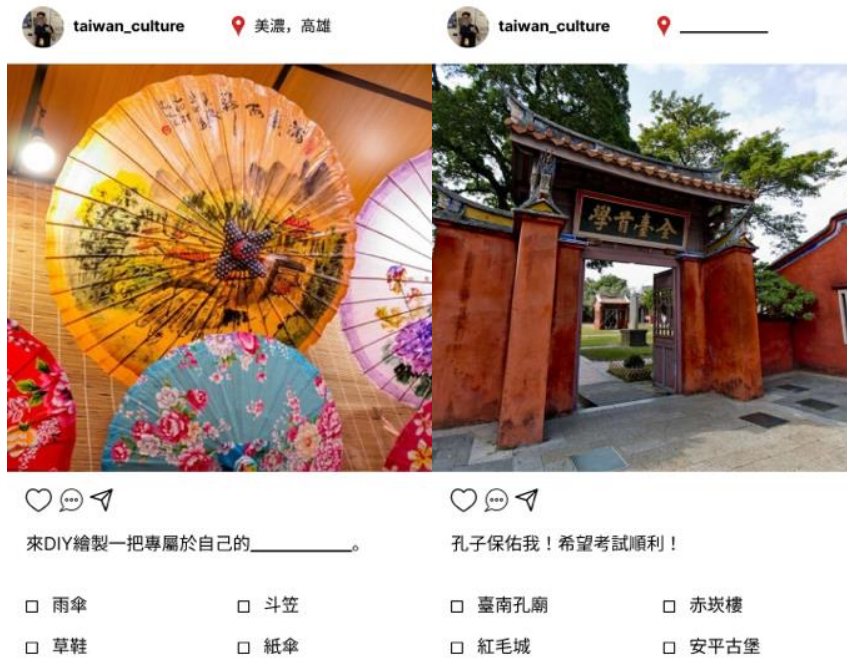


Figure 7 Examples of Posts Missing Key Word or Location

In the subsequent stage, upon players' selection of an answer, the game will present additional comprehensive information about the cultural heritage depicted in the post (as depicted in Figure 8). Consequently, players can acquire a deeper comprehension of the subject matter and ascertain whether their answer was accurate. Once the quiz is answered, players may progress to the subsequent quiz, which is also displayed in a format analogous to a social media post. The overall experience mimics that of browsing a social media platform.

美濃, 高雄



正確答案：

紙傘

美濃紙傘業曾有過一段輝煌歲月，全盛時期與菸葉、稻米同為美濃地區重要經濟收入，如今紙傘雖然不再是日常工具，但其藝術價值卻值得珍惜。

繼續

臺南孔廟



正確答案：

臺南孔廟

臺南孔子廟，位於臺灣臺南市中西區，是臺灣最早的文廟，建於明鄭永曆十九年（西元1665年）。清領初期是曾是全臺童生唯一入學之所，因而稱「全臺首學」。

繼續

Figure 8 Examples of The Answer and Detailed Information about Cultural Heritage

The workflow of the research game begins with an introduction that outlines the game's objective, which is to learn about Taiwanese culture through a series of quizzes that represent people's daily lives on a social media platform. The first quiz is presented immediately after the introduction. After selecting an answer, an answer page appears, providing the correct answer while displaying detailed information regarding the cultural heritage of the quiz. Players then proceed to the next quiz. The game's design simulates the experience of scrolling through a social media platform.

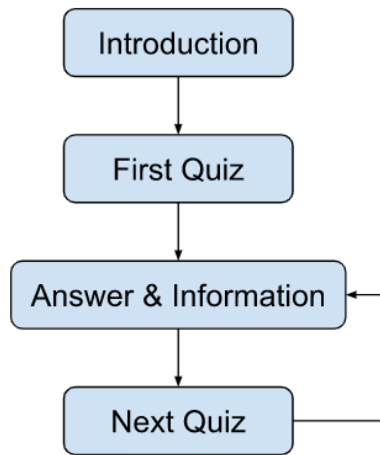


Figure 9 The Work Flow of the Game

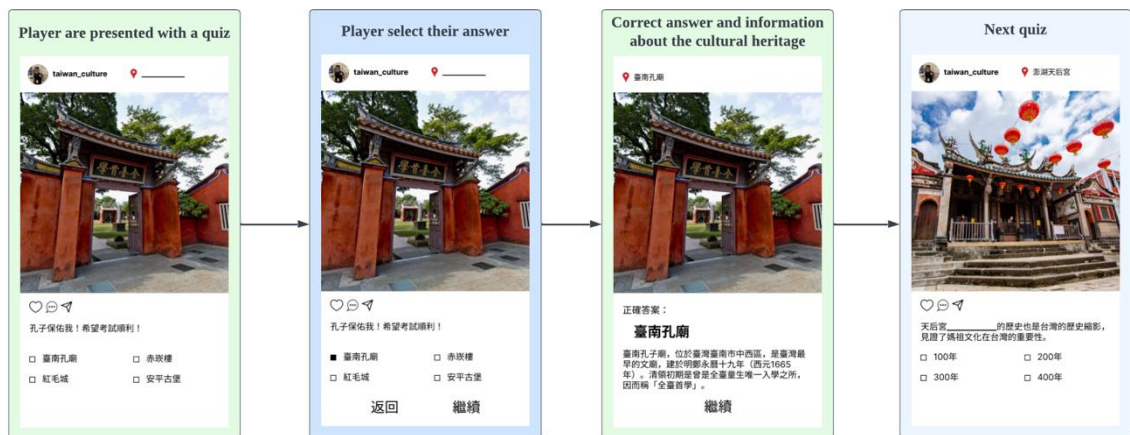


Figure 10 The Work Flow with UI Design of The Game

3.2.3 Development and Evaluation Phase

The present study intends to utilize Figma, a web application for user interface and user experience design, to develop a research game with numerous benefits. Figma allows developers to create content without coding skills, and it provides a graphic editor for an interactive and intuitive design process. Additionally, the prototype of the game can be presented online without requiring installation, making testing more convenient.

To accelerate the development phase of the framework, researchers will present the initial prototype in a rough form with minimal art and UI design. This approach allows for a more efficient development process and facilitates the evaluation of the game using qualitative methods such as expert interviews. Expert interviews are valuable in obtaining feedback and

guidance from individuals associated with the cultural or game industry. By selecting experts with relevant knowledge and experience, researchers can obtain valuable insights into the core concept of the game.

Experts can offer feedback on the educational value of the game and whether it is an effective format for educating cultural heritage content. Researchers can obtain feedback based on the experts' experiences and knowledge, providing valuable advice on how to improve the game. The use of expert interviews enables researchers to overlook the absence of finer design details and focus on the core concept.

In conclusion, Figma provides numerous benefits for developing the research game. The rough prototype allows for efficient development and expert interviews for evaluation. The game will serve as a valuable resource for individuals seeking to learn more about Taiwanese culture.

3.3 Evaluation of the Research Game

The evaluation phase of the research project is a critical stage in determining the effectiveness of the research game in educating users about cultural heritage. To ensure that the evaluation is thorough and informative, a qualitative method involving expert interviews will be utilized. The purpose of this method is to gain valuable insights from two groups of experts: those from the game industry and those from the cultural creative industry.

The goal of the expert interviews is to solicit feedback from experts in each field regarding game design and cultural heritage. The rationale for this approach is to strengthen the relationship between game design and cultural content, by bridging the knowledge gap between the two fields. The experts selected will have extensive experience in their respective industries, as well as knowledge of the other field. This ensures that the feedback provided is comprehensive and well-informed.

In selecting experts, the researcher will consider their background and experience in the relevant fields. For instance, an expert in the game industry who has a background in promoting Taiwanese historical architecture through game design will be considered. This individual will be able to provide valuable insights on how to incorporate cultural heritage into game design. Another expert who will be invited to participate in the study is a curator involved in the

planning of the Taipei Movie Festival. This expert has extensive experience in utilizing innovative technologies, such as immersive and interactive technologies, including games, in cultural events.

In preparation for the expert interviews, a set of questions will be provided to each expert. These questions will be categorized into two groups: game design and cultural heritage. The game design questions aim to identify potential game elements that could enhance player interest, as well as methods to improve player feedback during gameplay. Meanwhile, the cultural heritage questions will focus on identifying any missing cultural aspects in the game and pinpointing any cultural content that may offend some players. Additionally, experts will be asked to suggest types of cultural content that could gain more interest and provide any other recommendations they may have for improving the game. Interview questions are as follows:

- Game design
 - What are your thoughts on the concept of this game?
(Inspired by a social media platform)
 - What game elements do you think could be added to increase player's interest?
 - How to improve player's feedback while playing the game?
- Cultural heritage
 - What cultural aspect do you think is missing in this game?
 - Do you think there is any cultural content in the game that might offend people?
 - What kind of cultural content could gain more interest?
- Any other suggestions for this game?

The questions have been carefully formulated to encourage experts to share their knowledge and expertise openly. They are intended to cover a wide range of topics related to game design and cultural heritage, ensuring that the researcher gains a comprehensive understanding of the experts' viewpoints. By asking open-ended questions, the researcher hopes to receive rich and detailed responses that will help refine the research game.

The present study will use NVivo software to analyse the feedback provided by experts. The feedback analysis will follow two sequential steps. Firstly, a sentiment analysis will be performed to gauge experts' overall perceptions of the research game. Secondly, the responses

will be coded based on their content, followed by the organization and grouping of the codes into themes for each question. This analytical approach will facilitate the identification of the critical elements of the research game and aid in comprehending the experts' feedback. Ultimately, this analytical process will help to ensure that the final game effectively educates players about cultural heritage.

In conclusion, the expert interviews are a valuable tool in the evaluation phase of the research project. The feedback provided by the experts will be comprehensive and well-informed, ensuring that the game is effective in educating users about cultural heritage. The feedback will also be used to revise the game concept and development, ensuring that the game meets the needs and expectations of its target audience.

Chapter 4: Results and Findings

4.1 Introduction

In this study, expert interviews were conducted with a total of 21 participants who possess a background in the game or culture industry. A total of seven questions with open answer were given to the participants. The objective of the interviews was two-fold: firstly, to gather feedback to improve the prototype game, and secondly, to gain a general understanding of what factors should be considered while creating a game that aims to educate people about cultural content.

4.2 Sentiment Analysis

The researcher utilized NVivo software for data analysis. The experts' responses were subjected to sentiment analysis using a tool that classified them into four categories, namely "Very positive," "Moderately positive," "Moderately negative," and "Very negative" (Pudaruth et al., 2018). Sentences that did not fit into any of these categories were considered neutral and were not included in the table. The results showed that most of the experts provided positive feedback for the game being evaluated. Across all questions, both very positive and moderately positive feedback were more common than negative feedback, including both very negative and moderately negative as shown in Table.3. However, the question related to improving player feedback during gameplay received a higher number of negative responses due to limited interaction and feedback resulting from the restricted functionality of the UI creation tool, Figma. Despite this, the responses were considered valuable for developing the final game. Furthermore, the final question, "Any other suggestions for this game?" also received a higher negative response rate. The experts provided valuable feedback related to both game design and cultural content. In the subsequent sections, the authors present a detailed analysis and discussion of the feedback for each question.

Table 3: *The Results of Sentiment Analysis Using NVivo*

	Very negative	Moderately negative	Moderately positive	Very positive
What are your thoughts on the concept of this game? (Inspired by a social media platform)	1	1	3	2

What game elements do you think could be added to increase player's interest?	0	1	8	2
How to improve player's feedback while playing the game?	1	5	7	0
What cultural aspect do you think is missing in this game?	0	1	1	3
Do you think there is any cultural content in the game that might offend people?	1	0	2	1
What kind of cultural content could gain more interest?	0	2	3	2
Any other suggestions for this game?	0	4	5	1

4.3 Thematic Analysis

To conduct a thematic analysis of the data, the present study will initially focus on the three questions pertaining to game design, followed by the three questions concerning cultural heritage. The responses will be systematically coded based on their content, and related codes will be grouped together to form overarching themes. The resulting themes will provide insight into the key elements essential for the research game and facilitate the analysis of the final question.

4.3.1 Thematic Analysis on Feedback about Game Design

In this section, we discuss the three questions that are about game design:

- (1) What are the user's thoughts on the concept of the game?
- (2) What game elements do users think could be added to increase their interest?
- (3) How to improve player's feedback while playing the game?

The data has been analysed using NVivo software. The analysis includes coding, grouping codes to creating themes, and exploring the theme's connection with the research game.

The analysis of the experts' thoughts on the concept of the game resulted in the following themes: Attractive to Non-Gamers, Simple Gameplay, Combining Social Media, Technical Issue, Educational, Potential, Too Easy, Interactive, and User Interface. Experts found the game attractive to non-gamers and appreciated the use of social media as the theme. However, some experts found the game too easy and the content to be educational or serious, which might result in them losing interest quickly. There were also some issues with technical bugs, and some

experts felt that the game's user interface lack of feedback and might be boring to user. The frequency of each themes' appearances is explicated in Figure 11.

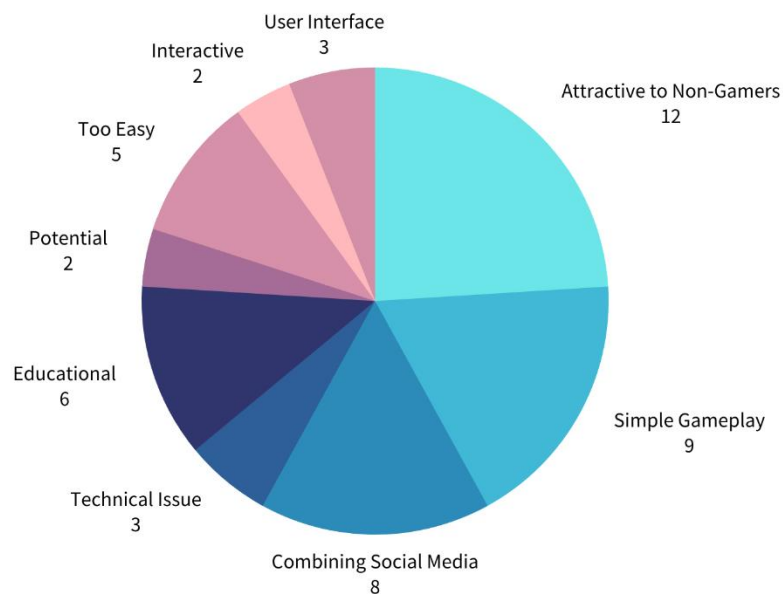


Figure 11 Frequency of Each Theme's Appearances Regarding the Response of Question 1

The analysis of the user's suggestions on game elements that could be added to Increase player's interest resulted in the following themes: Visual Design, Competition Mode, Question Classification, Modern Pop Culture, Different Game Modes, Rewards, Instagram Integration, Easter Eggs, Story Elements, and Difficulty Level. The frequency of each themes appearances is shown in Figure 12. Users suggested adding a different game mode such as a competitive mode where user could compete with others or a puzzle game mode that present game content in forms other than quiz; a categories of question types could help player to navigate to the content that they are most interested in, and modern pop culture references to the game could attract young audience. They also suggested adding story elements and rewards to increase engagement. Instagram integration and Easter eggs were also suggested to make the game more interactive and engaging. Additionally, the difficulty level was suggested to be increased as some found the game too easy.

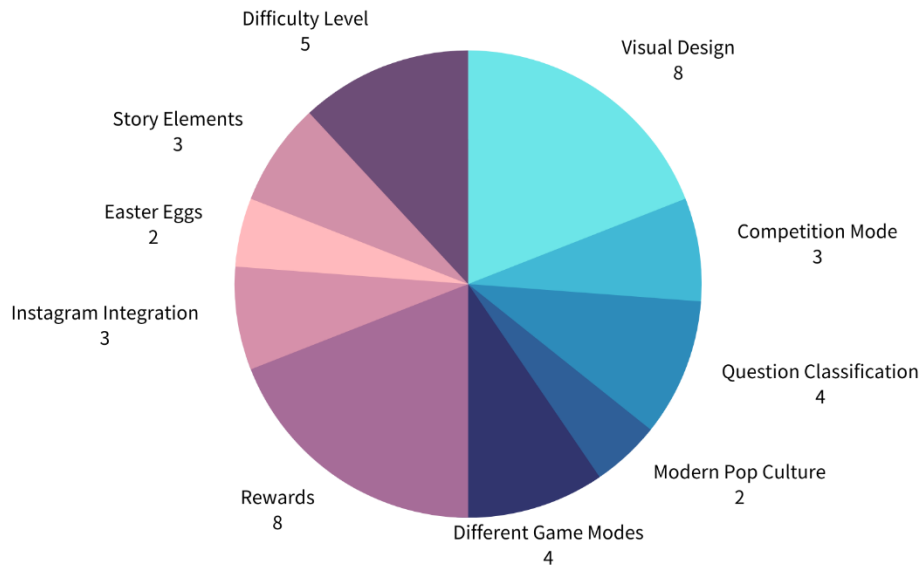


Figure 12 Frequency of Each Theme's Appearances Regarding the Response of Question 2

The analysis of expert's suggestions for improving player's feedback while playing the game resulted in the following themes: Progress Indicator, Feedback, Difficulty Level, and Animation as shown in Figure 13. Experts suggested adding a progress indicator to let player know where they have played up to. Some experts suggested adding more action to increase feedback such as using hearts or leaving comments, while others suggested using geotags to highlight tourist attractions. Difficulty level was also suggested to be increased to keep the player's interest. Finally, many experts suggested implementing animation on different action which help players having a more interesting playing experience.

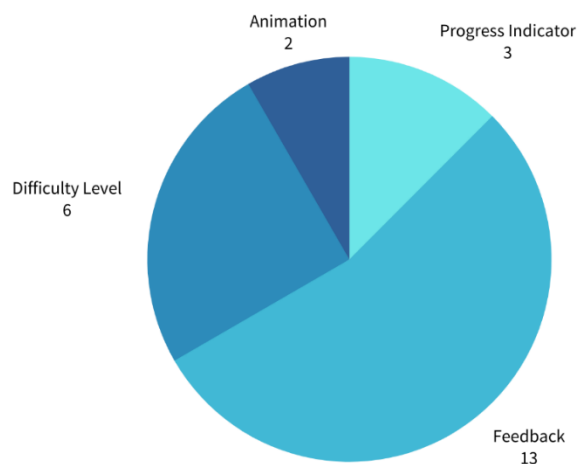


Figure 13 Frequency of Each Theme's Appearances Regarding the Response of Question 3

Based on the thematic analysis regarding the first three questions, it can be concluded that experts found the concept of the game to be attractive to people especially non-gamers and appreciated the use of social media as the game theme. However, there were concerns about the game's educational content might be too serious and lack of challenge; some technical bugs that might affect the gaming experience. To make the game more interesting and provide better feedback, experts suggested adding more game modes, question categories, modern pop culture references, rewards, Easter eggs, story elements, and increasing the difficulty level to improve player's interest. Finally, experts suggested adding a progress indicator, improving feedback, customizable difficulty level, and animation for different actions to improve player's feedback while playing the game.

4.3.2 Thematic Analysis on Feedback about Cultural Heritage

The aim of this section of analysis is to investigate the cultural aspect of a game based on three questions provided. The questions are related to the missing cultural aspect in the game, the possibility of cultural content that may offend people, and the type of cultural content that could gain more interest. The three questions are listed below:

- (4) What cultural aspect do you think is missing in this game?
- (5) Do you think there is any cultural content in the game that might offend people?
- (6) What kind of cultural content could gain more interest?

The answers to the question "What cultural aspect do you think is missing in this game?" were diverse and covered a wide range of cultural aspects. The themes that emerged from the answers included Music, Movie, Architecture, Religion, Food, Ecology, Festivals and Customs, Literature, Art and Crafts, Indigenous Culture and History, Languages and Dialects, Fashion and Beauty, Social and Political Issues, and Taiwanese History. The most frequent themes were food (mentioned six times), traditional festivals and customs (mentioned four times), and Taiwanese art and crafts, such as pottery, paper-cutting, and weaving (mentioned three times). The detailed results were shown in Figure 14.

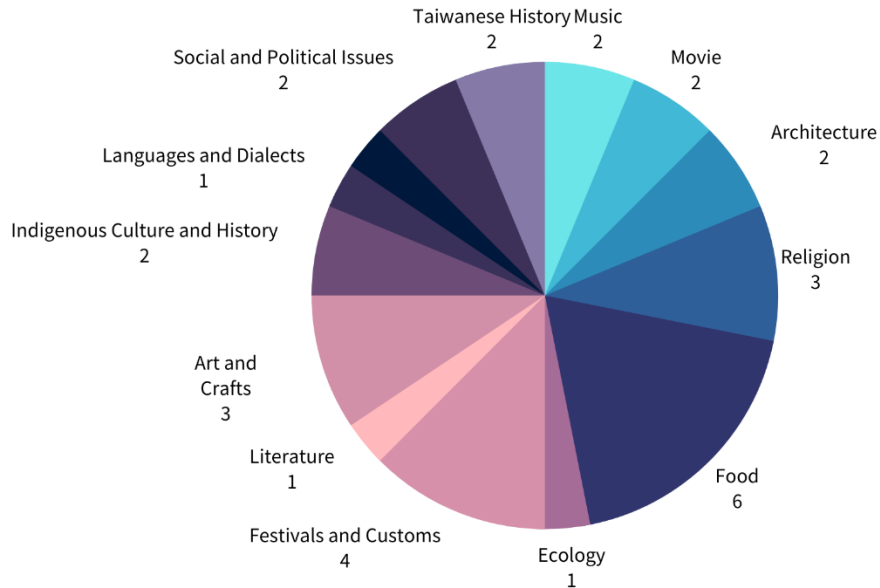


Figure 14 Frequency of Each Theme's Appearances Regarding the Response of Question 4

The answers to the second question were unanimous, with all respondents indicating that there was no cultural content in the game that might offend people. Some respondents mentioned the need to be careful not to violate the rights of use of cultural symbols and artifacts as shown in Figure 15.

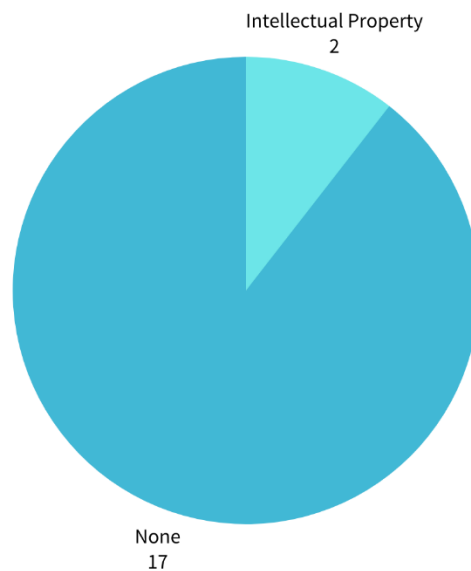


Figure 15 Frequency of Each Theme's Appearances Regarding the Response of Question 5

The analysis of expert's suggestions for cultural content that could gain more interest for players resulted in the following themes: Indigenous Culture, Taiwanese Cuisine, Taiwanese

History, Tourist Attractions, Urban Legends, Traditional Taiwanese Festivals and Celebrations, Taiwanese Calligraphy and other Traditional Art Forms, Taiwanese Fashion, Taiwanese Language and Dialects, Taiwanese Technology and Innovation, Taiwanese Sport Culture, Taiwanese Environmentalism and Conservation Efforts, Taiwanese Folklore and Mythology. The most frequent themes were traditional Taiwanese festivals and celebrations, such as the Dragon Boat Festival or Ghost Month, traditional craftsmanship and art, and Taiwanese cuisine including both food and tea culture. The frequency of each themes' appearances is presented in Figure 16.

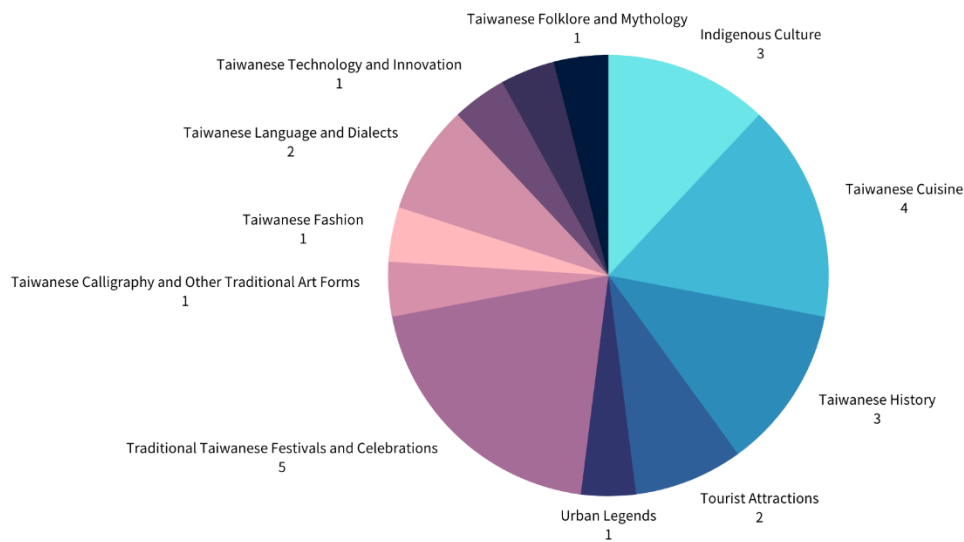


Figure 16 Frequency of Each Theme's Appearances Regarding the Response of Question 6

The analysis reveals that the respondents expressed a diverse range of cultural aspects that could potentially be incorporated into the game. The most common themes identified were food, traditional festivals, and traditional craftsmanship and art. The respondents further indicated that no cultural content currently present in the game might be deemed offensive, with the exception that developer should be aware of the intellectual property rights regarding content in the game. The findings of the analysis suggest that enhancing the game with additional cultural content pertaining to food, traditional festivals, crafts and arts could foster increased player interest. Additionally, the respondents offered suggestions for optimizing the game experience, including organizing cultural elements thematically, augmenting location markers with greater detail, and collaborating with governmental or private entities to integrate special design features. Implementation of such modifications may prove advantageous in terms of improving the overall gaming experience for players.

4.3.3 Analysis on the Final Question

At the conclusion of the interview, the experts were posed with the open-ended inquiry, "Any other suggestions for this game?", which aimed to gather their final thoughts on the research game. This segment of the interview yielded both positive and negative feedback. Notably, the theme of technical issues was reiterated in the negative feedback.

Expert 4: *If you want to use Figma for answering, you can create larger grid cells (including the text) to make clicking easier.*

Experts 8: *The button on the left is too close to the edge, making it difficult to click.*

Experts 9: *The bug really needs to be fixed.*

As the prototype game was developed using the user interface design tool Figma, it lacked the flexibility to make some minor adjustments, and technical issues might arise on mobile devices with display ratios that are not the most popular 16:9 or 18:9. Thus, for the final build of the game, it is imperative to test the user experience and provide an easy-to-use interface that caters to different devices.

The game's difficulty level was also a recurring topic of discussion. Expert 7 noted that while the game's current difficulty level may be appropriate for foreigners, it may be too easy for Taiwanese people, and the question descriptions and answer choices are too serious.

Expert 7: *The difficulty level of the questions can be adjusted. If the game is targeted towards foreigners, it's okay, but if it's for Taiwanese people, it may be a bit boring. The question descriptions and answer choices are all too serious.*

Expert 11 similarly suggested that the game should feature different difficulty levels for player with different level of knowledge.

Expert 11: *The game could benefit from having different difficulty levels to accommodate different levels of knowledge and interest.*

As the game was designed for the Taiwanese audience, it was deemed necessary to add more content with varying levels of difficulty. A customizable option that enables players to choose their preferred difficulty level would be the ideal solution.

In terms of positive feedback, the experts expressed their fondness for the game's concept and anticipation for the final product. Expert 1 described the game as "very interesting" and

expressed the desire to see the official version launched in the future. Expert 21 concurred with this sentiment, stating that the "spirit" of the game was captivating.

Expert 1: *It's very interesting, and I hope to see the official version launched in the future.*

Expert 21: *What I want to say was previously mentioned, and overall, the spirit feels quite interesting!"*

Overall, the experts provided valuable feedback for enhancing the game and optimizing the player's gaming experience.

4.4 Summary

Based on the findings presented in the preceding section, it can be inferred that experts have generally responded positively to the research game. The results of sentiment analysis indicate an overall positive attitude towards the game. Furthermore, the thematic analysis reveals that experts appreciated the game's representation as a social network platform and its simplicity of gameplay.

Regarding the cultural content of the game, the experts have provided several suggestions. They feel that the game might be too easy for Taiwanese people in its current state and recommend the addition of features that enable players to delve deeper into topics of their interest. Given that culture encompasses multiple aspects of our lives, experts suggest that more cultural content should be incorporated into the game. It was also suggested that modern cultures that are popular among specific groups of people, such as sports culture and fashion, could attract sport fans and female audiences.

Despite the generally positive feedback, experts have provided constructive criticism that can be instrumental in improving the game. For instance, the experts noted the importance of ensuring a fluid and enjoyable gaming experience, similar to that of scrolling through a social network application. This could be challenging, as the current game was developed with a tool with limited functionality. It was also suggested that the game's content was too easy and that a customizable difficulty level could be a possible solution. Furthermore, to sustain players' interest, the experts suggested incorporating additional content, such as a competitive mode, different game modes, and customizable difficulty levels. Overall, the feedback provided by the experts has highlighted several potential areas of improvement for the game, which could enhance its appeal to a broader audience.

Chapter 5: Discussion

Culture is widely recognized as an invaluable asset of humanity, embodying the knowledge and achievements accumulated across various domains (Glazer, 2000). The significance of both tangible and intangible cultural heritage is highly regarded, with tangible heritage being preservable in controlled environments through restoration efforts, while intangible heritage encompasses behaviours and knowledge that reside solely within human minds (Alivizatou-Barakou et al., 2017). The preservation and transmission of cultural heritage to future generations are crucial for ensuring the perpetuation of ancestral knowledge and accomplishments (Cozzani et al., 2017).

Taiwan, having undergone multiple colonization periods throughout its history, boasts a wealth of rich and diverse cultural content (Rubinstein, 2015). However, in contrast to tangible cultural heritage such as arts and architecture, intangible cultural heritage is rapidly diminishing. Numerous native languages and traditional craftsmanship have been lost over time (Belew & Simpson, 2018).

With the continuous advancement of technology on a global scale, the methods and mediums for preserving cultural heritage have become increasingly diverse. The people of Taiwan exhibit openness to new media and different cultures. To facilitate the learning of Taiwanese culture among individuals in Taiwan and raise awareness of its value, this research aims to design a serious game centered around Taiwanese culture and explore public perceptions of such an endeavour.

This research aims to develop a prototype game that disseminates content pertaining to Taiwanese cultural heritage, facilitating cultural learning and fostering an appreciation for its value. Employing expert interviews as the validation method, the study seeks to address the overarching research question: "What are the benefits of using games for Taiwanese culture?" Additionally, it investigates sub-questions such as: 1) Can the game contribute to the preservation of Taiwanese culture? 2) Can the game effectively educate players about Taiwanese culture? and 3) Can the game serve as a promotional tool for Taiwanese culture? The subsequent section delves into these research inquiries, presenting the findings derived from expert feedback.

Based on the findings derived from the expert interviews, it is evident that the research game has garnered favourable feedback from the experts. Specifically, the integration of the game with a social media platform has been well-received and has garnered appreciation. This response underscores the significance of embracing innovative technologies and staying attuned to evolving trends (Balacheff et al., 2009). It is noteworthy that individuals generally allocate considerable time and attention to media that resonates with their personal interests, as exemplified by the pervasive popularity of social media platforms in the context of Taiwan (Lin, 2017).

Although the game is designed to emulate a social media platform, experts appreciate the concept. Simultaneously, they express concerns that players may lose interest quickly if the game lacks sufficient content. Therefore, if our intention is to design a game that does not overtly resemble a traditional game, it should still incorporate more game elements to sustain players' interest, such as additional game modes, scoring systems, and competitive modes. As discussed in the literature review, it's essential that the serious game needs to be both engaging, and fun, if we want to use it as an effective educational tool (Gee, 2005).

Experts emphasize the multidimensionality of culture, with each domain evoking distinct interests, as discussed in the literature review (White, 1959). Nonetheless, many experts also acknowledge the significance of modern culture, encompassing areas such as fashion, sports, and pop culture. This suggests that when designing a serious game specifically aimed at promoting cultural content, it is crucial to consider not only historical aspects but also contemporary cultural elements, which can attract a broader audience.

Considering the diverse range of individual interests and the abundance of cultural content available, it is advisable, as recommended by the experts, to enable users to contribute their own content to the game. This approach would transform the game into a platform that not only resembles a social media platform but also functions as one. Users would have the opportunity to generate cultural content that aligns with their specific interests, and they could even create content based on their personal experiences. In instances where users are unable to find cultural content pertaining to their particular interests, they would have the ability to generate their own content and share it with others.

In relation to the concern surrounding potentially sensitive cultural content that may elicit offense, experts hold the view that individuals in Taiwan generally exhibit a receptiveness to diverse perspectives. Moreover, certain sensitive subjects, including religion, are considered valuable cultural assets that warrant inclusion within the game. Notably, some experts even propose the incorporation of political themes, provided that the content does not espouse a particular viewpoint or convey strong and aggressive messages. Additionally, experts highlight the significance of addressing intellectual property rights when generating content for the game. This aspect assumes great importance and necessitates careful consideration throughout the content creation process. In the context of facilitating user-generated content, it becomes imperative to establish mechanisms for assessing whether any legal rights are infringed upon to ensure compliance with legal frameworks.

During the experiment design phase, we chose to conduct expert interviews, allowing them to overlook potential design and visual shortcomings and focus on the game's overall design and content. However, experts still provided feedback regarding certain visual and technical aspects of the research game. To address this issue, further refinement of the prototype is necessary, enabling experts to concentrate on the content itself rather than being distracted by minor issues resulting from the limitations of the design tools used.

In conclusion, games offer an effective means of facilitating cultural learning, particularly when it comes to Taiwanese culture. By engaging in gameplay, individuals can explore and familiarize themselves with new cultural content. Furthermore, if the game incorporates social media features and enables players to generate their own content, it has the potential to become a comprehensive database of cultural heritage. This approach transcends Taiwanese culture alone and can be applied to other cultures as well. Moving forward, we will continue to enhance the game's functionality, address any existing issues, and refine it into a valuable product that not only aids in the learning of Taiwanese culture but also contributes to the preservation of its cultural heritage as knowledge.

Chapter 6: Conclusion

Taiwanese culture represents a valuable asset; however, many individuals in Taiwan fail to recognize its significance. Consequently, various forms of cultural heritage, particularly intangible ones, suffer from neglect, particularly among the younger generation. Indigenous languages are rapidly disappearing as their usage declines, while traditional craftsmanship faces the risk of extinction due to a lack of appreciation and willingness to learn. Preserving Taiwanese culture and instilling an understanding of its value is of utmost importance.

The objective of this thesis is to address this concern through the implementation of technology, specifically a game that presents cultural content. The positive feedback received from expert interviews regarding this approach validates its potential. The insights provided by experts are invaluable in the development of a game that facilitates cultural learning and enhances understanding of Taiwanese culture. These feedbacks will guide the refinement of the prototype game presented in this thesis and will prove valuable for future game projects related to cultural content.

However, this research is not without limitations. Firstly, insufficient time prevented the design, development, and refinement of the prototype game based on the feedback obtained from expert interviews, as well as conducting further experiments. Employing this approach would have yielded more valuable feedback. Secondly, although expert interviews were chosen to focus on design and content, some experts still provided feedback regarding technical issues. For future research in a similar vein, it is crucial to consider this aspect and ensure that the game is free from technical shortcomings. Lastly, due to time and resource constraints, the research did not conduct experiments involving the target audience, namely ordinary Taiwanese individuals. Their feedback, as members of the gaming and cultural industries, is equally significant. Therefore, future iterations of the game prototype should prioritize gathering their insights through game testing and surveys.

The research team will refine the prototype game based on the valuable feedback provided by the experts. Among these feedbacks, the inclusion of a function allowing players to create their own content shows the most potential. However, this also introduces challenges for the game. For instance, it becomes crucial to ensure that users create appropriate content related to cultural heritage, avoiding any offensive or intellectual property rights violations. Moreover, given the

purpose of the game is to facilitate cultural learning, it is paramount to ensure the accuracy of the content and ideally provide references. Therefore, if the research team wishes to incorporate user-generated content, an authentication process must be implemented to verify the appropriateness and accuracy of the submitted material.

Despite the challenges faced during the research process and the potential complexities in developing the game further with more advanced functions, the team remains committed to this endeavour due to the value Taiwanese culture holds. The team aims to create a final game that effectively aids people in learning about Taiwanese culture and fosters a deeper appreciation for it. Additionally, the findings of this thesis can serve as a valuable resource for other researchers in the field of cultural game-related research. Furthermore, it is our hope that the thesis will assist game designers and cultural creative industry professionals who intend to develop games centered around Taiwanese culture. We aspire to see more designers engaging with Taiwanese culture through games, ultimately facilitating broader understanding and appreciation of it among the public.

References

- Age of Empires II: The Age of Kings (PC version) [Video game]. (1999). Microsoft.
- Alivizatou-Barakou, M., Kitsikidis, A., Tsalakanidou, F., Dimitropoulos, K., Giannis, C., Nikolopoulos, S., ... & Grammalidis, N. (2017). Intangible cultural heritage and new technologies: challenges and opportunities for cultural preservation and development. *Mixed reality and gamification for cultural heritage*, 129-158.
- Andreoli, R., Corolla, A., Faggiano, A., Malandrino, D., Pirozzi, D., Ranaldi, M., ... & Scarano, V. (2017). A framework to design, develop, and evaluate immersive and collaborative serious games in cultural heritage. *Journal on Computing and Cultural Heritage (JOCCH)*, 11(1), 1-22.
- Assassin's Creed II (Xbox 360 version) [Video game]. (2009). Ubisoft.
- Balacheff, N., Ludvigsen, S., De Jong, T., Lazonder, A., Barnes, S. A., & Montandon, L. (2009). *Technology-enhanced learning*. Springer.
- Balela, M. S., & Mundy, D. (2015). Analysing cultural heritage and its representation in video games. In *DiGRA Conference* (pp. 1-16).
- Belew, A., & Simpson, S. (2018). Language extinction then and now. In *Cataloguing the World's Endangered Languages* (pp. 49-65). Routledge.
- Berger, A. A. (2016). *What objects mean: An introduction to material culture*. Routledge.
- Blake, J. (2000). On defining the cultural heritage. *International & Comparative Law Quarterly*, 49(1), 61-85.

- Blyth, C. (2018). Immersive technologies and language learning. *Foreign Language Annals*, 51(1), 225-232.
- Boyle, E. A., & Connolly, T. M. (2018). A review of the value of using games and gamification to enhance learning and assessment. *Higher Education, Skills and Work-Based Learning*, 8(3), 355-366.
- Chen, Z., Cao, H., Deng, Y., Gao, X., Piao, J., Xu, F., ... & Li, Y. (2021, May). Learning from home: A mixed-methods analysis of live streaming based remote education experience in Chinese colleges during the Covid-19 pandemic. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (pp. 1-16).
- Cho, L. (2010). *Eating Chinese: Culture on the menu in small town Canada*. University of Toronto Press.
- Collepari, M. (1990). Degradation and restoration of masonry walls of historical buildings. *Materials and structures*, 23, 81-102.
- Cozzani, G., Pozzi, F., Dagnino, F. M., Katos, A. V., & Katsouli, E. F. (2017). Innovative technologies for intangible cultural heritage education and preservation: the case of i-Treasures. *Personal and Ubiquitous Computing*, 21, 253-265.
- De Miguel-Molina, M. B., Hervás-Oliver, J. L., De Miguel-Molina, M., & Hedderich, B. (2013). Do museums innovate in the conservation and restoration of artwork? Differences between countries. *Dirección y Organización*, 50(2), 17-30.
- Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: defining “gamification.” In *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments* (pp. 9-15).

- Gaitatzes, A., Christopoulos, D., & Papaioannou, G. (2005). Virtual reality systems and applications: The ancient Olympic games. In *Panhellenic Conference on Informatics* (pp. 155-165). Springer.
- Gee, J. P. (2005). Learning by design: Good video games as learning machines. *E-learning and Digital Media*, 2(1), 5-16.
- Hart, S., Margheri, A., Paci, F., & Sassone, V. (2020). Riskio: A serious game for cyber security awareness and education. *Computers & Security*, 95, 101827.
- Headland, T. N. (2003). Thirty endangered languages in the Philippines. *Work Papers of the Summer Institute of Linguistics, University of North Dakota Session*, 47(1), 1.
- Hsu, P. I. (2019). The influence of internet celebrities to the consumer behavior of young people in southern Taiwan. (Thesis. I-Shou University) *Taiwan doctoral and master's thesis knowledge value-added system*. <https://hdl.handle.net/11296/u6s8a3>.
- Huang, C. M., & Guo, Y. A. (2020). The demodulating and encoding heritage (DEH) platform for mobile digital culture heritage (M-DCH). *Journal of Internet Technology*, 21(3), 765-781.
- Hung, C. H. (2015). *Multiculturalism in Taiwan*. Taiwan Wunan Book Publishing.
- Inglis, D. (2004). *Culture and everyday life*. Routledge.
- Jeuring, J., Grosfeld, F., Heeren, B., Hulsbergen, M., IJntema, R., Jonker, V., ... & Zeijts, H. V. (2015, September). Communicate!—a serious game for communication skills—. In *European Conference on Technology Enhanced Learning* (pp. 513-517). Springer.
- Kato, P. M. (2010). Video games in health care: Closing the gap. *Review of General Psychology*, 14(2), 113-121.

- Katsaounidou, A., Vrysis, L., Kotsakis, R., Dimoulas, C., & Veglis, A. (2019). MATHe the game: A serious game for education and training in news verification. *Education Sciences, 9*(2), 155.
- Kenterelidou, C., & Galatsopoulou, F. (2021). Sustainable biocultural heritage management and communication: the case of digital narrative for UNESCO marine world heritage of outstanding universal value. *Sustainability, 13*(3), 1449.
- Klisch, Y., Miller, L. M., Wang, S., & Epstein, J. (2012). The impact of a science education game on students' learning and perception of inhalants as body pollutants. *Journal of science education and technology, 21*(2), 295-303.
- Koch, J., Pearson, J., Lucero, A., Sturdee, M., Mackay, W. E., Lewis, M., & Robinson, S. (2020, April). Where art meets technology: integrating tangible and intelligent tools in creative processes. In *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems* (pp. 1-7).
- Kuhn, J. (2018). Minecraft: education edition. *Calico journal, 35*(2), 214-223.
- Kurin, R. (2004). Safeguarding intangible cultural heritage in the 2003 UNESCO Convention: a critical appraisal. *Museum international, 56*(1-2), 66-77.
- Laamarti, F., Eid, M., & Saddik, A. E. (2014). An overview of serious games. *International Journal of Computer Games Technology, 2014*, 11-11.
- Lackovic, N., Crook, C., Cobb, S., Shalloe, S., & D'Cruz, M. (2015). Imagining technology-enhanced learning with heritage artefacts: teacher-perceived potential of 2D and 3D heritage site visualisations. *Educational Research, 57*(3), 331-351.

- Lee, C. C. (2020). Between home and travel: Procedural rhetoric and mobile game “Traveling Frog”. *The Journal of Information Society*.
- Lin, S. Y. (2017). A study on psychological needs and continuous usage intention of young people for Instagram (Thesis. National Taiwan Normal University) *Taiwan doctoral and master's thesis knowledge value-added system*.
<https://hdl.handle.net/11296/uc6n53>.
- Liu, N. Y. C., Miao, K. C. J., & Ying, D. C. Y. (2022). A metric instrument for the games with cultural heritage. *International Journal of Serious Games*, 9(4), 89-136.
- Liu, N. Y. C., Wills, G., & Ranchhod, A. (2018, August). Game for supporting dementia carers. In *2018 IEEE Games, Entertainment, Media Conference (GEM)* (pp. 1-8). IEEE.
- Liu, T., Chuk, T. Y., Yeh, S. L., & Hsiao, J. H. (2016). Transfer of perceptual expertise: The case of simplified and traditional Chinese character recognition. *Cognitive science*, 40(8), 1941-1968.
- Lu, Y. C. (2017). Research on historic BIM in the preservation of tangible cultural heritage - Taking the Sulfur Creek Academy in Taichung city as an example. (Thesis. National Chiao Tung University) *Taiwan doctoral and master's thesis knowledge value-added system*. <https://hdl.handle.net/11296/aevpys>.
- Mathew, P. S., & Pillai, A. S. (2020). Role of immersive (XR) technologies in improving healthcare competencies: a review. *Virtual and Augmented Reality in Education, Art, and Museums*, 23-46.

- Menon, L. (2015). History first-hand: Memory, the player and the video game narrative in the Assassin's Creed games. *Rupkatha Journal on Interdisciplinary Studies in Humanities*, 7(1), 108-113.
- Mitgutsch, K., & Alvarado, N. (2012, May). Purposeful by design? A serious game design assessment framework. In *Proceedings of the International Conference on the foundations of digital games* (pp. 121-128).
- Native Language Resource Network. (2018). Indigenous language use statement. *Ministry of Education*. Retrieved October 19, 2022, from <https://mhi.moe.edu.tw/newsList.jsp?ID=5>
- Nicolaou, C., Matsiola, M., & Kalliris, G. (2019). Technology-enhanced learning and teaching methodologies through audiovisual media. *Education Sciences*, 9(3), 196.
- Nushi, M., & Eqbali, M. H. (2017). Duolingo: A mobile application to assist second language learning. *Teaching English with Technology*, 17(1), 89-98.
- Oliva, C. (2019). Taiko no Tatsujin: musical literacy in the media mix. In *DiGRA 2019: Game, Play and the Emerging Ludo Mix, Kyoto*. 1-13.
- Olszewski, A. E., & Wolbrink, T. A. (2017). Serious gaming in medical education: a proposed structured framework for game development. *Simulation in Healthcare*, 12(4), 240-253.
- Paras, B. S., & Bizzocchi, J. (2005, June). Game, motivation, and effective learning: An integrated model for educational game design. In *DiGRA Conference*.

- Peng, H. S., & Chu, J. Y. (2017). Japan's colonial policies—from national assimilation to the Kominka Movement: a comparative study of primary education in Taiwan and Korea (1937–1945). *Paedagogica Historica*, 53(4), 441-459.
- Petty, J. (2013). Interactive, technology-enhanced self-regulated learning tools in healthcare education: A literature review. *Nurse education today*, 33(1), 53-59.
- Pudaruth, S., Moheeputh, S., Permessur, N., & Chamroo, A. (2018). Sentiment analysis from Facebook comments using automatic coding in NVivo 11. reliability. *Psychol. Bull*, 86, 420-428.
- Quinn, N., & Holland, D. (1987). Culture and cognition. *Cultural models in language and thought*, 1.
- Ravenscroft, A., Prendeville, S., Eklund, J., & Arias, F. (2017). Never Alone: Creating a game to share Inupiaq culture. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (pp. 2618-2629). ACM.
- Rochat, Y. (2019). A quantitative study of historical video games (1981–2015). In *Historia Ludens* (pp. 3-19). Routledge.
- Romaine, S. (2007). Preserving endangered languages. *Language and Linguistics Compass*, 1(1-2), 115-132.
- Rubinstein, M. A. (2015). *Taiwan: A New History: A New History*. Routledge.
- Schito, E., & Testi, D. (2017). Integrated maps of risk assessment and minimization of multiple risks for artworks in museum environments based on microclimate control. *Building and Environment*, 123, 585-600.

Scovazzi, T. (2015). Intangible cultural heritage as defined in the 2003 UNESCO convention.
In *Cultural Heritage and Value Creation* (pp. 105-126). Springer.

Semeraro, F., Frisoli, A., Loconsole, C., Mastronicola, N., Stroppa, F., Ristagno, G., ... &
Cerchiari, E. (2017). Kids (learn how to) save lives in the school with the serious
game Relive. *Resuscitation*, 116, 27-32.

Shelton, B. E., & Scoresby, J. (2011). Aligning game activity with educational goals:
Following a constrained design approach to instructional computer games.
Educational Technology Research and Development, 59(1), 113-138.

Shi, C., & Shih, M. (2015). Playing with cultural differences: Educational games for cultural
awareness. *Educational Technology & Society*, 18(1), 294-308.

Shi, Y. R., & Shih, J. L. (2015). Game factors and game-based learning design model.
International Journal of Computer Games Technology, 2015.

Shih, Y. C. (2015). A virtual walk through London: Culture learning through a cultural
immersion experience. *Computer Assisted Language Learning*, 28(5), 407-428.

Sicart, M. (2008). Defining game mechanics. *Game studies*, 8(2), 1-14.

Sid Meier's Civilization VI (PC version) [Video game]. (2016). 2K Games.

Spencer-Oatey, H., & Franklin, P. (2012). What is culture. *A compilation of quotations*.
GlobalPAD Core Concepts, 1, 22.

Suh, A., & Prophet, J. (2018). The state of immersive technology research: A literature
analysis. *Computers in Human Behavior*, 86, 77-90.

- Suh, S. (2020). Fashion everydayness as a cultural revolution in social media platforms—
Focus on fashion Instagrammers. *Sustainability*, 12(5), 1979.
- Sulistiyo, E., Anwar, N., Warnars, D. T. S., Wibawa, S. C., Brotosaputro, G., Kristiadi, D.
P., ... & Hashimoto, K. (2019, December). Implementation of mobile game for
religion learning. In *2019 IEEE International Conference on Engineering,
Technology and Education (TALE)* (pp. 1-7). IEEE.
- Sylvain, R. (1996). Leo Frobenius. From "Kulturkreis to Kulturmorphologie". *Anthropos*,
483-494.
- Taiko no Tatsujin: The Drum Master! (Xbox Series S/X version) [Video game]. (2022).
Bandai Namco Entertainment.
- Tan, S. K., Tan, S. H., Kok, Y. S., & Choon, S. W. (2018). Sense of place and sustainability of
intangible cultural heritage—The case of George Town and Melaka. *Tourism
Management*, 67, 376-387.
- Tillmann, N., De Halleux, J., Xie, T., Gulwani, S., & Bishop, J. (2013, May). Teaching and
learning programming and software engineering via interactive gaming. In *2013 35th
International Conference on Software Engineering (ICSE)* (pp. 1117-1126). IEEE.
- Tseklevs, E., Cosmas, J., & Aggoun, A. (2016). Benefits, barriers and guideline
recommendations for the implementation of serious games in education for
stakeholders and policymakers. *British Journal of Educational Technology*, 47(1),
164-183.
- Tseng, Y. L., Sato, N., Yeh, S. S., & Huan, T. C. (2017). Tourism in preserved nature areas in
Taiwan. In *Nature tourism* (pp. 196-207). Routledge.

- Tsikinas, C., & Xinogalos, S. (2020). A conceptual framework for serious games design for individuals with intellectual disabilities. *Journal of Educational Computing Research*, 57(7), 1596-1625.
- Tuan, T. H., & Navrud, S. (2008). Capturing the benefits of preserving cultural heritage. *Journal of cultural heritage*, 9(3), 326-337.
- Tylor, E. B., & Suith, E. L. D. E. R. (1871). Primitive culture: Researches into the development of mythology, Philosophy. *The Athenaeum*, 261.
- UNESCO. (2009). Text of the convention for the safeguarding of intangible cultural heritage. International conference on the safeguarding of tangible and intangible cultural heritage: Towards an integrated approach. <https://ich.unesco.org/en/convention>
- Vecco, M. (2010). A definition of cultural heritage: From the tangible to the intangible. *Journal of cultural heritage*, 11(3), 321-324.
- Wang, T. S. (2015). *Legal reform in Taiwan under Japanese colonial rule, 1895-1945: The reception of western law*. University of Washington Press.
- Weber-Sabil, J., & Han, D-I. D. (2021). *Immersive Tourism - State of the Art of Immersive Tourism Realities through XR Technology*. Breda University of Applied Sciences. https://www.buas.nl/sites/default/files/2021-05/Immersive%20Tourism_State%20of%20the%20Art_final.pdf
- Wei Y. L. (2013). Western clothing culture and its influence on the development of the cheongsam. *Wool Textile Journal*, 41(10).
- Whatmore, S. (2006). Materialist returns: practising cultural geography in and for a more-than-human world. *Cultural geographies*, 13(4), 600-609.

- White, L. A. (1959). The concept of culture. *American anthropologist*, 61(2), 227-251.
- Wouters, P., van Nimwegen, C., van Oostendorp, H., & van der Spek, E. D. (2013). A meta-analysis of the cognitive and motivational effects of serious games. *Journal of Educational Psychology*, 105(2), 249-265.
- Yakuza Kiwami (PC version) [Video game]. (2019). SEGA.
- Yoshida, K. (2004). The museum and the intangible cultural heritage. *Museum International*, 56(1-2), 108-112.
- Zheng Y. X., (2019). The breakdown and establishment of traditional crafts in Taiwan. *Chinese Handicrafts*, (3), 34-35.
- Zilio, D., Orio, N., & Zamparo, L. (2021). FakeMuse: A serious game on authentication for cultural heritage. *Journal on Computing and Cultural Heritage (JOCCH)*, 14(2), 1-22.
- Zinnatova, M. V. (2021). Virtual workshops: immersive technology of vocational education of the future. *МЕТОДИКА*, 90, 90.