Participatory Co-Creation of Digital Nang Talung: Bridging the Generation Gap to Preserve Intangible Cultural Heritage in Southern Thailand

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By
Setthee Boonchoo
Canterbury – United Kingdom

Abstract

This research focused on the preservation and revitalization of Nang Talung, an intangible cultural heritage (ICH) rooted in the southern region of Thailand. A mixed-method approach, involving multiple stages of study, was employed to explore its feasibility through surveys and action research for data collection.

The objectives of the study were to examine the current state of traditional Nang Talung, to create a new model of Digital Nang Talung, and to evaluate its effectiveness in enhancing users' knowledge, attitudes, and practices (KAP) related to Nang Talung.

Finally, the research investigated whether the generational gap between older and younger participants was reduced after engaging with the Digital Nang Talung application.

The development phase employed a digital arts process that incorporated participatory and co-creation methods, alongside surveys for data collection. Both quantitative and qualitative data were collected through self-administered questionnaires, focus group discussions, observations, and interviews.

The purposive sample included the following groups:
- Youth aged 18–25 currently enrolled in the International Media Program at Prince of Songkla University (PSU)
- Students from the College of Arts, Media, and Technology at Chiang Mai University (CMU)
- Expert puppeteers and the elderly group were included

Key findings emerged during participatory co-creation workshops, where younger participants, expert puppeteers, and researchers collaborated to design characters and other elements.

Scenes, storylines, and gameplay featuring both story mode and freestyle mode were developed, along with AR marker versions 1.0 and 2.0. These artefacts resembled traditional puppet-holder sticks and were novel designs created specifically for the project.

The Digital Nang Talung Alpha Version (https://digitalung.itch.io/nang-talung-book) was developed as a site-specific theatre platform, incorporating interactive multiplayer and two-way communication features. Its effectiveness in enhancing users' KAP was evaluated through testing.

Based on data, opinions, suggestions, and ideas from both traditional Nang Talung experts and younger participants, the final model, the **Digital Nang Talung Beta Version** (https://digitalung.itch.io/digi-nang-talung) was developed. This version features fully online gameplay in both story and freestyle modes and was released as an accessible online application.

The assessment across four research stages revealed a risk of decline for this ICH, emphasizing the urgent need for innovative strategies to preserve and revitalize this traditional folk medium. Usability, satisfaction, and learning engagement with the Digital Nang Talung application were also evaluated.

Participants reported positive experiences regarding usability and high satisfaction levels in engaging with the application.

The Digital Nang Talung Alpha Version significantly improved users' KAP, with pre- and post-test mean scores showing statistically significant differences. Using inferential statistics (t-test), the results were P < 0.01, with t-values for knowledge, attitudes, and practices at 10.356, 10.081, and 12.457, respectively.

The Beta Version was evaluated using two workshop models:
- **Model A:** Face-to-face collaboration between younger and older participants
- **Model B:** Fully online, self-guided engagement using participants' personal devices

Model A yielded promising results in bridging the KAP gap between generations. Inferential statistical analysis (t-test) showed a statistically significant difference (P < 0.01) in pre-test scores, with post-test mean scores converging, indicating a reduced gap.

However, **Model B** presented challenges for older participants, particularly in usability and engagement. Observations revealed increased stress and discomfort due to technology use.

These findings suggest that digital arts and tools, when applied through participatory and co-creation processes, offer a promising strategy for cultural preservation, especially when participants are involved in every step. However, to maintain the essence of traditional folk media, it is essential to improve digital literacy and learning environments.

Future research should account for generational differences to ensure accessibility across age groups and focus on how to effectively convey the puppeteers' skillset to modern audiences. The artefact could also be positioned as an interactive engagement tool.

Dedication

"I dedicate this work to my beloved father, who is no longer physically with me during this valuable journey."

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1.1 Introduction and Research Background

This research focuses on the preservation of Nang Talung, a traditional form of Thai shadow puppetry from Southern Thailand, which has been a significant part of the region's cultural identity. As a popular form of folk entertainment, Nang Talung has long reflected the values, stories, and traditions of the local community. However, like many forms of traditional art, Nang Talung is under threat due to changing societal structures, urbanization, and the shifting interests of younger generations. This research explores how digital art and modern technology can serve as tools for revitalizing and safeguarding this cultural heritage, ensuring that it continues to thrive in the modern era.

Nang Talung is one of two shadow puppetry traditions native to Southern Thailand, the other being Nang Yai (Lim, 2013). While both forms use leather puppets to narrate stories, they differ in scale and technique. Nang Yai features life-sized puppets operated by multiple puppeteers, while Nang Talung uses smaller, more intricate figures, typically manipulated by a single puppeteer (Lim, 2013). The two forms of shadow puppetry have distinct origins, with Nang Yai believed to be influenced by Cambodian and Indian shadowplay traditions, whereas Nang Talung is more closely linked to the small city of Pattalung in Southern Thailand (Brandon, 1967). Despite these differences, both share common themes and narrative elements with other regional art forms, such as Nang Pramo Thai, a shadow puppetry tradition from northeastern Thailand (Brereton & Yenchuey, 2007).

While Nang Talung has not yet been formally recognized by UNESCO as part of its List of Intangible Cultural Heritage, it remains a crucial part of Southern Thailand's intangible cultural practices. Intangible cultural heritage refers to the living traditions, skills, and knowledge that are passed down through generations, yet risk disappearing if not actively preserved (Lenzerini, 2011). Similar to the Javanese Wayang Kulit, Nang Talung combines traditional performance art with storytelling and plays an important role in regional identity and historical continuity (Pradana & Srisontisuk, 2023). Both Nang Talung and Wayang Kulit originated in agricultural societies, where they provided entertainment during post-harvest seasons. However, the decline of agricultural life and migration of younger generations to urban centers have contributed to a decrease in interest in these art forms (Pradana & Srisontisuk, 2023).

The challenges faced by Nang Talung today are reflective of the broader difficulties in preserving intangible cultural heritage in the face of rapid modernization. Although strategic efforts have been made to preserve Nang Talung alongside other traditional Southern Thai art forms—such as Thai folk music, manora (traditional dance), and likay hulu (dramatic art)—interest in Nang Talung continues to wane (Nilvanich & Wisuttipat, 2017). Previous research has focused on documenting these traditions, promoting cultural education, and integrating them into tourism. However, the survival of Nang Talung relies not only on preservation

strategies but also on the ability to inspire younger generations to engage with the art form in meaningful ways.

This research goes beyond conventional preservation strategies by exploring how digital art and modern technology can offer innovative pathways for revitalizing Nang Talung. By using digital tools to create interactive and immersive experiences, this study aims to make Nang Talung accessible to a wider and younger audience, ensuring its relevance in a rapidly changing world. This approach draws on the potential of digital art to bridge generational divides and engage younger people, allowing the tradition to adapt while preserving its core elements. Ultimately, the goal is to maintain the vibrancy of Nang Talung as a living art form that evolves alongside the society it reflects.

1.2 Research Rationale

The traditional shadow puppet "Nang Talung" holds significant cultural value in Southern Thailand, representing a rich form of intangible cultural heritage. However, like many traditional performance arts, Nang Talung is facing a decline due to changing audience preferences and the rise of modern entertainment forms. This research is driven by the need to revitalize Nang Talung by leveraging its role as cultural capital and integrating digital art tools to ensure its survival as a living tradition.

Cultural capital as defined by Bourdieu (1986), Nang Talung encompasses:

1. **Embodied capital:** The characters and stories reflecting local values and traditions.
2. **Objectified capital:** The handcrafted puppets as cultural artifacts.
3. **Institutionalized capital:** The profession of the puppeteer, passed down through generations.

Despite its cultural significance, Nang Talung is in danger of becoming obsolete. Historically, it flourished in rural, agricultural communities where it served as a popular form of entertainment during the post-harvest season. However, with the decline of agricultural lifestyles and the rise of digital entertainment, younger generations have shifted their interests toward smartphones and social media (Nilvanich and Wisuttipat 2017). This generational shift presents a significant challenge for the preservation of Nang Talung, as there are now fewer puppeteers and audiences who engage with the art form.

The decline of interest in Nang Talung mirrors a broader trend seen across traditional performance arts worldwide. Cultural traditions, while rooted in history, are not static; they change and adapt over time to reflect the shifting values and technologies of society (Hobsbawm and Ranger 2012). In this context, preserving Nang Talung as cultural capital means not only safeguarding its traditional forms but also allowing it to evolve in ways that resonate with contemporary audiences, particularly younger generations.

This research proposes the use of digital art tools to revitalize Nang Talung and bridge the generation gap. Digital storytelling, through the use of animation, augmented reality (AR), and

virtual reality (VR), provides a modern platform to reintroduce Nang Talung to younger audiences (Kang and Yang 2020; Robin and McNeil 2019). These digital tools offer new ways to tell the traditional stories of Nang Talung, while maintaining the core elements of its cultural capital. This approach enables the art form to retain its traditional essence while adapting to the technological landscape favored by today's youth.

Previous research has shown that digital storytelling is an effective tool for preserving intangible cultural heritage (Rizvic et al. 2019). By incorporating Nang Talung into digital platforms, the aim is to generate renewed interest in this form of shadow puppetry, making it more accessible and engaging for younger people. This participatory approach acknowledges that Nang Talung belongs not to researchers or external stakeholders but to the community that engages with it, ensuring that the tradition is preserved authentically while being revitalized (Lenzerini 2011).

In conclusion, the rationale for this research is to explore how Nang Talung, as being a cultural capital, can be preserved and revitalized using digital art tools. By integrating tradition with technology, this research seeks to safeguard Nang Talung as a living art form and ensure its continued relevance in the face of modern challenges.

1.3 Objectives of the Study

1. To explore the current state of traditional **Nang Talung**.
2. To create a new model of **Nang Talung** based on participatory and co-creation design.
3. To apply modern technology and digital art tools to develop an original prototype of Digital **Nang Talung**.
4. To test the designed Digital **Nang Talung** in view of improving participants' knowledge, attitudes, and practices.
5. To examine the generation gap between older and younger participants regarding Digital **Nang Talung**.

1.4 Research Question

The aim of this research is to identify ways to bridge the generational gap in order to preserve **Nang Talung**, an intangible cultural heritage in Southern Thailand. This will facilitate the preservation of this art form through the participatory development of a digital storytelling approach.

The research questions are:
1. How do younger Thai people perceive **Nang Talung** as a performance art, and how can access to and interest in **Nang Talung** among youth be promoted?
2. How can participatory design and co-creation be utilized to create a model and implementation plan for Digital **Nang Talung**?
3. How can tools such as 2D animation, augmented reality (AR markers), game design, and interaction design be employed to create a novel form of Digital **Nang Talung** that enhances users' knowledge, attitudes, and practices (KAP)?

4. How can Digital **Nang Talung** bridge the generational gap and address real-world needs as a form of folk media?

1.5 Scope of Research

This research focuses on **Nang Talung**, the southern Thai shadow play. It employs both survey and action research methodologies, utilizing purposive sampling techniques. The sample comprises two age groups: a younger group (university students aged approximately 18–25 years) and an older group (individuals over 60 years old).

The research process consists of four stages. The first step (pilot study) uses survey techniques to explore the current situation of **Nang Talung** in Southern Thailand from the youth's perspective.

The second and third steps (Study I and Study II) involve action and survey research designs using participatory and co-creation workshops, focus groups, interviews, and observation techniques. Questionnaires are also developed as instruments for data collection. In these steps, the first version of Digital Nang Talung is developed and tested to address the research questions.

The final step (Study III) focuses on improving the previous Digital Nang Talung and evaluates the generational gap between the youth and older participants.

The research sites are located in Southern Thailand, with The Prince of Songkla University (PSU) serving as one base site and Chiang Mai University (CMU) in the north as another base site for studies and experiments. These studies are summarized in Table 1.1.

Table 1.1 The scope of the four studies on Digital Nang Talung

Research Study	Pilot Study	Study I	Study II	Study III
Research Question	RQ 1	RQ 2	RQ 3	RQ 4
Research Design	Survey Research	Action / Survey Research	Action / Survey Research	Action / Survey Research
Samples	Purposive Sampling Technique	Purposive Sampling Technique	Purposive Sampling Technique	Purposive Sampling Technique
Data Collection	- Questionnaires - Interview	- Participatory Co-Creation workshop - Focus Group - Interview	- Questionnaires - Observation - Focus Group - Interview	- Questionnaires
Data Analysis	- Descriptive	- Thematic	- Descriptive	- Descriptive

	Analysis - Content Analysis	Analysis	Analysis - Inferential Statistics	Analysis - Inferential Statistics

1.6 Definition of Terms

Traditional Nang Talung refers to a Southern Thai traditional form of shadow puppetry that uses cut leather puppets, manipulated against a light source to create a performance in a specific setting.

Traditional Stick refers to the stick used to control puppets in the traditional Nang Talung performance.

Expert Puppeteer (EP) refers to an experienced and skilled individual who manipulates puppets behind a light source, bringing them to life through movement, narration, and storytelling.

Nang Talung Puppet refers to a small, movable cow leather puppet, measuring between 15 and 50 cm in height, painted, decorated, and manipulated by puppeteers.

Digital Nang Talung Application refers to the digital form of **Nang Talung** developed through participatory and co-creation workshops conducted as part of this research study.

The Digital Nang Talung Alpha Version refers to the initial interactive version of the Digital Nang Talung application, designed as a site-specific theater platform.

The Digital Nang Talung Beta Version, also known as **the Digi Nang Talung Beta Version**, refers to the fully online version of the Digital Nang Talung application.

AR Marker refers to the marker that uses Augmented Reality techniques to control the virtual puppet assembled with traditional sticks.

Younger Group (YG) Participants refers to university students, aged approximately 18–25 years, who are available and willing to participate in the research.

Older Group (OG) Participants refers to individuals over the age of 60 who are available and willing to participate in the research.

Generation Gap refers to the differences in knowledge, attitude, and practice between younger and older participants who take part in this research.

Knowledge, Attitude, and Practice (KAP) refers to the participants' knowledge, attitudes, and practical skills related to the developed Digital Nang Talung.

Digital Nang Talung Character Design refers to the creation of new puppet characters based on the traditional Nang Talung puppets, as proposed by the participants in the study.

1.7 Research Contribution

This research aims to contribute significantly to the preservation and revitalization of Nang Talung, an intangible cultural heritage of Southern Thailand, by:

1. Providing a comprehensive understanding of the current situation of Nang Talung, addressing both challenges and opportunities for its preservation.
2. Creating a contemporary model for traditional folk art through participatory and co-creation design, involving different age groups to foster intergenerational collaboration.
3. Developing and testing an original digital Nang Talung prototype, aimed at engaging younger generations and ensuring its relevance in modern culture.
4. Ensuring the sustainability of traditional Nang Talung in the modern world by integrating digital tools while preserving its cultural essence.

Chapter 2 : Literature Review

2.1 Introduction

This chapter provides an overview of key concepts, knowledge, and research studies related to Intangible Cultural Heritage, Folk Media, Nang Talung, and Digital Arts Concepts and Tools. It introduces the study's framework, which forms the main focus of the research described in this thesis. To outline the scope of the study, this chapter covers seven topics: Intangible Cultural Heritage; Folk Media and Nang Talung, the generation gap, digital arts and tools, related research, assessment approaches, theoretical framework, and the identified research gaps based on the reviewed literature.

2.2 Intangible Cultural Heritage

Intangible Cultural Heritage (ICH) encompasses the practices, expressions, knowledge, skills, and associated tools, objects, and cultural spaces that communities and groups recognize as integral to their cultural identity (UNESCO, Convention for the Safeguarding of the Intangible Cultural Heritage, Article 2). Transmitted across generations, ICH is continuously adapted and recreated by communities in response to their environment and historical context, fostering a shared sense of identity and creativity.

Cultural heritage is deeply rooted in centuries of development and transformation. It exists within communities through the accumulation of knowledge and understanding, fostering awareness, cultivating pride, encouraging preservation efforts, and appreciating cultural expressions as meaningful legacies open to transformation (Kieven, L., 2021).

Additionally, shadow play, as a form of cultural heritage, can be analyzed through Bourdieu's concept of cultural capital, as observed by Pradana & Srisontisuk (2023):

1. **Embodied State:** This includes the creative processes involved in crafting shadow puppets, from conceptualizing characters to employing intricate inlay techniques. Furthermore, the puppeteer's ability to mimic a wide range of voices for numerous characters exemplifies the Embodied State.
2. **Objectified State:** The finished shadow puppets, such as those used in Nang Talung (Thailand) and Wayang Kulit (Indonesia), are considered tangible cultural assets.
3. **Institutionalized State:** The professions of puppeteers and craftsmen, passed down through generations, represent an Institutionalized Cultural Entitlement, preserving traditional artistry within these cultural practices.

Thailand has successfully inscribed four traditions on UNESCO's Representative List of the Intangible Cultural Heritage of Humanity:
- Khon (masked dance) – 2018
- Thai traditional massage – 2019
- Nora (Southern Thailand's dance drama) – 2021

● Songkran, the Traditional Thai New Year Festival – 2023

However, the preservation of ICH faces challenges due to societal changes such as urbanization and industrialization. For instance, Indonesia's Wayang Kulit, a traditional Javanese shadow puppet performance, is under threat as agrarian communities transition to industrialized societies (Pradana & Srisontisuk, 2023). Traditionally performed in rural agricultural communities as post-harvest entertainment, Wayang Kulit is now in decline due to the loss of its original social and cultural context. As a living cultural tradition, its disappearance would represent an irreplaceable loss to cultural diversity and heritage (Lenzerini, 2011).

Barakou-A., et al. (2022) reviewed ICH as a living cultural expression recognized by communities. They examined various projects and technologies supporting ICH and identified gaps in their application. The findings highlight numerous opportunities to utilize technology for cultural heritage preservation, particularly in facilitating its transmission and education. Technology plays a crucial role in sustaining historical knowledge and enabling its transfer to future generations. It is essential to actively involve cultural practitioners in research and development efforts related to ICH. Contrary to past concerns, technology is no longer a threat to the survival of ICH. Instead, it is a vital tool for enhancing the transmission of traditional knowledge and skills through digital platforms. One of the biggest challenges is identifying the most effective technologies for capturing, analyzing, presenting, and reusing ICH in meaningful ways.

Disneyfication and Intangible Cultural Heritage
The analysis of new models, such as Disneyfication, is crucial for understanding cultural transformation.

The Disneyfication model is rooted in large-scale industrial projects, such as the creation of Disneyland (1955) and Disney World (1971). It is based on constructing a cultural imaginary that has become a pillar of modern mass culture. Disneyfication serves as both an aesthetic and structural model, originating from Disney's productions and expanding globally. The theory of Disneyfication emerges at the intersection of mass culture, economics, and communication, shaping how heritage is adapted and represented.

One example is the study of Panji and Sekarataji, an intangible cultural heritage in Java (Kieven, 2020). This research examines how traditional shadow puppetry is adapting to contemporary global influences. The complexity of heritage preservation is deeply connected to community values, intellectual traditions, artistic expression, symbolism, and cultural significance. However, when Disneyfication is applied to these traditional forms, intrinsic cultural values are often neglected in the process of making heritage more commercially viable and accessible.

A similar concern appears in studies on Urban McDisneyfication (Schwarz, 2020), which explore the commodification of traditional craftsmanship in European cities like Lisbon and Bruges. The research highlights how urban spaces are transformed to cater to mass tourism, leading to the homogenization of culture. Traditional crafts are repackaged for tourist consumption, prioritizing

efficiency and predictability, much like fast-food chains. This shift often results in the loss of authenticity and cultural depth.

The negative effects of McDisneyfication pose a challenge to the safeguarding of traditional urban culture and the promotion of local meaning. Clarke (2016) echoes these concerns, focusing on how intangible cultural heritage (ICH) is manipulated in urban settings, shaping cultural landscapes in ways that raise broader questions of authenticity.

Disneyfication, as a global commercial phenomenon, often leads to cultural standardization, which can contribute to the homogenization of traditions.

An investigation into Disneyfication in intangible storytelling heritage (Fleming, 2021) examines how the commodification of folklore has influenced the perception of fairies in Newfoundland. While the study does not explicitly use the term "Disneyfication," it highlights how locals recognize Disney's influence on their understanding of fairy folklore. One participant even expressed concern about fairy experiences becoming "too Disneyfied"—a reflection of the tension between preserving authentic folklore and adapting it to fit popular culture.

In contrast, some studies suggest that Disneyfication can support heritage safeguarding. Massing (2018) examines how theme parks in China contribute to the preservation of ICH. The Chinese government promotes heritage safeguarding within theme park-like environments, designating some as "National ICH Productive Protection Bases". These initiatives aim to increase the economic value of cultural heritage while ensuring its continuity.

Ludwig and Wang (2020) provide further insight by discussing the "heritage industry critique" that emerged in the 1980s. Critics argue that the commodification of cultural heritage—including Disneyfication—creates inauthentic representations of the past, prioritizing commercial appeal over historical accuracy. However, Ludwig and Wang also point out that authenticity is subjective. In living heritage traditions, adaptation and transformation are natural and necessary for their survival.

The Double-Edged Nature of Disneyfication
The term "Disneyfication" is generally used in a critical or pejorative sense. It refers to the simplification, sanitization, and commercialization of culture for mass consumption (Bryman, 2004). In heritage studies, it describes how complex cultural traditions are reshaped into standardized, visually attractive, and market-oriented forms. The term is used analytically to examine processes such as aesthetic adaptation, gamification, and narrative simplification, rather than to endorse cultural commodification.

As an analytical framework, Disneyfication can be seen as double-edged. On one hand, it is linked to cultural homogenization and aesthetic simplification. Rich symbolic meanings, ritual depth, and locally grounded values may be reduced to easily consumable and entertaining formats. This reduction can weaken authenticity and disconnect cultural expressions from their community context (Bryman, 2004).

On the other hand, similar processes are sometimes described as "heritage gamification" or "strategic cultural simplification," especially in digital environments. Gamification involves applying game design elements to non-game contexts to increase engagement (Deterding et al., 2011). In heritage settings, gamification and simplification may improve accessibility and support intergenerational transmission by presenting traditions in interactive and playful ways.

2.2.1 The Development of Nang Talung as a Folk Media

Intangible cultural heritage, as a form of folk media, is an essential tool for preserving and transmitting cultural knowledge, histories, and values. It includes traditional forms such as folk plays, ballads, rituals, and puppetry, which have been passed down through generations (Tamuli & Mishra, 2023). Unlike mass media, folk media is decentralized, caters to smaller audiences, and maintains intimate connections with its cultural context (Kamei, 2015). Beyond entertainment, folk media fosters intergenerational relationships and conveys cultural values, playing a key role in national identity and development initiatives (Kumar, 2012).

Despite its deep roots in tradition, folk media remains dynamic, adapting to changing social contexts while preserving cultural significance (Hobsbawm & Ranger, 2012). It continues to serve as a bridge between generations, particularly in societies with high illiteracy rates, where it facilitates education and nation-building (Edet et al., 2015).

Thailand is rich in folk media traditions, including Mau Lum, Likay, and Khon. Among these, Nang Talung, a shadow puppet performance from Southern Thailand, uniquely integrates storytelling, music, and puppetry. Traditionally performed behind illuminated screens, Nang Talung conveys moral teachings, social values, and cosmological themes through narratives delivered in local dialects. While many stories draw on Buddhist concepts such as karma, the tradition also reflects the religious and cultural diversity of Southern Thailand, where Muslim practitioners and audiences contribute to its performance context.

Historically, Nang Talung was deeply embedded in rural and temple-centered life in provinces such as Nakhon Si Thammarat, Songkhla, and Phatthalung. Performances were staged in temporary structures and typically lasted throughout the night. The nai nang (puppeteer) functioned simultaneously as performer, ritual specialist, storyteller, and social commentator. Knowledge transmission occurred through apprenticeship, emphasizing vocal technique, improvisation, musical coordination, and craftsmanship. Puppets, carved from cowhide and painted according to established iconographic conventions, depicted kings, monks, villagers, ogres, spirits, and especially clown figures (talok), whose humor enabled indirect social critique.

Much of the widely cited scholarship describing the shift from ritual-centered village performance to commercially oriented and urban-adapted forms particularly the work of Dowsey-Magog (1994; 2002) is based on field research conducted primarily during the late 1980s and 1990s. These studies document a period in which Nang Talung increasingly incorporated amplified sound systems, contemporary music, popular culture references, and urban festival settings. Dowsey-Magog (1994) observed a growing emphasis on humor and

spectacle, as well as a movement along a continuum between Nang Boran (Ancient Nang) and Nang Samai (Modern Nang).

However, since the early 2000s, additional developments have further transformed the performance landscape. Beyond urbanization and commercialization (Koanantakool-Chalermpow, 1989), Nang Talung has entered new institutional, digital, and cultural heritage frameworks. Performances now circulate through tourism circuits, educational programs, cultural markets, and online media platforms. Modern productions may incorporate digital sound systems, recorded distribution, social media promotion, and collaborations with artists and cultural entrepreneurs. Political satire has also become more explicit in certain contexts, reflecting broader national political shifts.

Therefore, while Dowsey-Magog's work remains foundational for understanding the late 20th-century transition toward hybrid and commercially adaptive forms, contemporary Nang Talung operates within an expanded ecosystem shaped by globalization, digital mediation, cultural policy, and creative industries. Rather than representing a fixed stage of "modernization," current practice demonstrates an ongoing process of negotiation between ritual authority, market forces, political expression, and technological change.

2.2.1.1 The Role of Puppeteer

The role of the puppeteer in Nang Talung performances is defined by a dual identity as both an instructor and an entertainer (Koanantakool-Chalermpow, 1989).

The Puppeteer as an Instructor
Puppeteers are highly respected as teachers due to their extensive cultural and spiritual knowledge, which they pass on to both pupils and audiences. Their performances embed moral and ethical teachings, such as the importance of filial piety, the law of karma, and the virtue of gratitude. These values are conveyed through archetypal characters: heroes embody bravery and gratitude, giants represent immorality and brutality, and stepmothers often symbolize jealousy. Puppeteers reinforce these lessons through direct commentary or hidden messages delivered via humorous dialogues, particularly those of the clowns.

Their mastery of poetic expression often brings them lasting fame, as seen with celebrated puppeteers throughout history. Additionally, successful puppeteers frequently achieve financial stability and social prominence.

Beyond cultural knowledge, puppeteers also possess spiritual expertise, enhancing their role as ritual specialists. They perform critical ceremonies, such as vow-releasing rituals, which involve contacting the spirit world to fulfill promises made by the host.

The Puppeteer as an Entertainer
As entertainers, puppeteers captivate audiences through humor, storytelling, and dynamic performances. Clowns play a crucial role in this aspect, often using both explicit and implicit jokes, including sexual humor, to evoke laughter. This comedic element is integral to Nang Talung and significantly contributes to its enduring popularity.

Puppeteers, known for their charisma and verbal dexterity, sometimes attract romantic attention, leading to complex personal relationships that contrast with their role as instructors. Their ability to modulate their voices and create distinct vocal characters adds to the audience's enjoyment. Skilled puppeteers must possess self-confidence and the ability to earn the trust of their spectators. The introduction of electric musical instruments has also helped attract younger audiences.

In modern contexts, entertainment has become a dominant focus for some puppeteers, incorporating political satire, critiques of corruption, and contemporary settings. These elements cater to evolving audience preferences, emphasizing humor and relevance over traditional moral teachings.

Balancing Instruction and Entertainment
The dual roles of instructor and entertainer coexist, with the balance between them shifting according to societal expectations and individual puppeteers' styles. Traditional puppeteers prioritize moral instruction, while modern puppeteers place greater emphasis on entertainment and audience engagement. This dynamic reflects the evolving nature of Nang Talung, which blends its educational roots with the demands of contemporary entertainment.

The humor in Nang Talung is often tailored to suit different audiences. For instance, performances for uneducated villagers differ in style and content from those designed for sophisticated urban audiences. Despite these variations, there is a fundamental structure that makes Nang Talung unique. Puppeteers must master two key elements: voice manipulation (narration) and the ability to perform independently, as Nang Talung is traditionally a one-person act. Puppeteers enjoy a high degree of creative freedom, using their art to comment on contemporary issues through direct or disguised messages, particularly in the clowns' dialogue. For example, sex education themes may be conveyed implicitly or explicitly through the clown character Teng, whose forefinger is cut out in the shape of a male sex organ as a symbolic gesture.

Additionally, changes in audience preferences, financial challenges, and urbanization pose significant difficulties for contemporary puppeteers, particularly those living in towns rather than rural villages. Many no longer enjoy the strong community support they once had. Therefore, government initiatives, educational programs, and cultural awareness efforts are essential to preserving this valuable art form.

2.2.1.2 The Puppet Uniqueness

Southeast Asian shadow puppetry is distinct in its craftsmanship and storytelling. Each puppet embodies unique characteristics that bring rich narratives and cultural values to life. The puppets are meticulously crafted, with leather carved into intricate patterns and painted with colorful details.

Typically, the puppets are lightweight and easy to manipulate using bamboo sticks. Each puppet is adorned in stunning cloth, enhancing its visual appeal. Usually, only one arm of each

character is movable, consisting of three joints at the shoulder, elbow, and wrist. The other arm remains fixed, often holding a weapon—except for jesters, who can move both hands.

Classification of Puppets
Puppets in Nang Talung are generally divided into three groups:
1. Deities, Protagonists, and Nobles
2. Commoners
3. Jesters (Clowns)

The commoners and jesters, in particular, represent the essence of southern Thai culture, using local dialects, parody, satire, and witty puns to reflect village life. Below are examples of different puppet personalities and their symbolic meanings:

1. Deities and Holy Men
These characters, often depicted with ascetic hats, beards, and staffs, represent wisdom and moral guidance. They serve as advisors or mediators in the narratives. Ghosts, on the other hand, appear as skeletons and embody fear and the supernatural, adding an element of suspense to the performances.

2. Ogres
Ogres have thick eyebrows, coarse facial features, and large teeth, distinguishing them from the elegance of royals. Dressed in traditional attire and wielding clubs, they symbolize raw power and chaos. They are often depicted standing on one leg, emphasizing their energy and aggression. Female ogres share these characteristics but lack weapons, balancing strength with femininity.

3. Kings and Queens
These majestic figures wear tall crowns and are often shown atop the symbolic naga serpent, signifying divine authority. Their elegant features—almond-shaped eyes, small mouths, and sophisticated hairstyles—reinforce their royal status and idealized beauty.

4. Heroes and Princes
Heroes and princes are celebrated for their bravery and charm. They wear elaborately embroidered costumes reminiscent of traditional lakhon or likay theater. Their swords, carried parallel to their backs, symbolize readiness for battle. With their topknot hairstyles and poised demeanor, they command admiration. In modern adaptations, these characters sometimes take on contemporary appearances, wearing sunglasses and trendy clothing, especially when portrayed as bandits.

5. Heroines
Heroines are depicted with graceful curves and intricate coiffures, embodying ideals of modesty and elegance. However, lower-status women are sometimes shown in modern and provocative attire, reflecting shifts in societal norms. These characters add emotional depth and complexity to the narratives.

6. Clowns: The Heart of Nang Talung

Clowns play a vital role in Nang Talung, representing local villagers and adding humor to the performances. Their primary function is to reflect and comment on society, inspiring audiences to find joy and wisdom in everyday life. Traditionally, no village festival would be complete without a Nang Talung performance.

Among all characters, clowns hold a unique and revered position. Figures like Nui and Teng are central to shadow theater, blending humor with social commentary. Their exaggerated and distorted forms—often black in color with oversized features—make them easily recognizable.

Beyond being comedic figures, clowns are seen as semi-divine beings, bridging the spiritual and human realms. Their role is deeply respected within the shadow puppet tradition, as they offer both entertainment and profound insights.

Characteristics of Clown Figures

Clowns in Nang Talung share similarities with clown figures in other Southeast Asian traditions, such as Pak Dogol and Wak Long in Malaysia or Semar and his sons in Java. Their exaggerated physiques often have animalistic and sexual connotations, emphasizing their mischievous and playful nature.

One of their most distinctive features is their protruding index finger, which is often shaped like a phallus (Dowsey-Magog, 1994). This element symbolizes fertility, humor, and irreverence, reinforcing their status as both comedic and spiritual figures. Their exaggerated features not only entertain but also convey deeper cultural and philosophical meanings.

Key Clown Characters

Nui

Nui is quick-witted and sly, known for his sharp tongue and ability to outsmart others. As a trickster figure, he uses humor and cleverness to navigate challenges posed by kings, heroes, and ogres. Nui's antics often serve as a critique of societal norms, bridging the mythical and real worlds.

Teng

Teng, in contrast, is cheerful and lighthearted, relying on physical comedy and exaggerated movements. His interactions with Nui create a dynamic interplay of wit and laughter, making their exchanges highly entertaining for audiences of all ages.

Despite their comedic roles, Nui and Teng are deeply respected. Their ability to entertain while imparting moral lessons makes them cherished figures in Nang Talung. They act as social commentators, using satire to challenge authority, question traditions, and expose hypocrisy. Their semi-divine status reflects the belief that humor and irreverence are essential for balancing sacred and worldly matters.

Nui and Teng's roles connect shadow puppetry to local identity and heritage. Their enduring presence in performances—where their designs have remained largely unchanged for decades—demonstrates their continued relevance in Thai culture.

Clowns frequently break the fourth wall, interacting with the audience through jokes, contemporary references, and social commentary. This ability to adapt to modern times while staying rooted in tradition ensures their lasting appeal. Skilled puppeteers use Nui and Teng to gauge audience reactions, adjusting performances accordingly to keep spectators engaged.

Thus, clowns are more than just entertainers—they are cultural icons, storytellers, and spiritual figures. Through humor, wisdom, and distinctive character designs, they embody the heart of shadow puppetry, preserving its values and traditions while making it relevant to contemporary audiences.

Other Puppet Forms and Their Symbolism
Other puppet figures reflect societal roles through their attire and accessories. Military officers, police, and bureaucrats are easily recognizable by their uniforms, emphasizing their roles within the narratives. The artistic elements of these puppets often incorporate Central Thai design motifs, such as the Kanok flame pattern, linking them to the broader Thai cultural heritage.

Despite centuries of evolution, shadow puppetry has maintained key design elements. From 18th-century puppets in Nakhon Si Thammarat to 20th-century designs, royal crowns, ascetic headdresses, and specific postures have remained remarkably consistent. While adapting to modern influences, these traditions continue to preserve their spiritual and artistic essence.

This vibrant array of puppet forms weaves together humor, drama, and cultural reflection, captivating audiences while ensuring that the legacy of Nang Talung endures for generations.

2.2.1.3 The Performance

A Nang Talung performance consists of two major parts: the ritual and the dramatic (Koanantakool-Chalermpow, 1989).

1. The Ritual
The performance begins with a ritual sequence, featuring a series of short episodes. One common scene depicts a hermit, moving in an exaggerated manner to mimic an old man walking and flying. Another features a deity riding a black bull, with movements synchronized to the rhythm of the music. These ritual elements are believed to bring good fortune and spiritual protection to the performance.

2. The Dramatic Performance
The dramatic portion of Nang Talung has undergone significant modifications over time. Traditionally, performances were based on the Ramakian (the Thai adaptation of the Ramayana). However, in modern times, puppeteers create original stories, drawing inspiration from various sources such as films, contemporary events, and social issues.

While traditional narratives often featured characters like princesses, princes, ogres, hermits, and jesters (villagers), modern adaptations incorporate diverse themes to engage contemporary audiences.

The storytelling in the dramatic part follows three primary narrative modes:

1. Verse – Poetic storytelling that enhances the lyrical quality of the performance.
2. Dialogue – Spoken exchanges between characters to drive the plot.
3. Clown Speech – Improvised humor and social commentary, usually delivered by the clowns.

The principal characters typically speak in Central Thai, while the clowns, who provide comic relief and cultural commentary, speak in the Southern Thai dialect. The humor style is often adapted to suit the audience's preferences, making each performance unique and interactive.

2.2.1.4 The Story Structure

The story structure in Nang Talung performances can follow a classical plot set in a pseudo-historical setting, take a realistic approach by depicting everyday dilemmas, or combine both approaches within a single performance. This flexibility allows for a seamless integration of traditional mysticism and contemporary realism (Dowsey-Magog, 1994).

Stories typically begin with a conflict or problem, leading to the start of a journey—which may or may not reach a complete resolution. However, the focus often remains on the ongoing adventures of characters as they help others along the way.

The narratives may serve as a medium for cultural and literary knowledge, the sharing of practical information, discussions on modern social issues, or reflections on government policies and regulations.

Even with the inclusion of contemporary themes and modern attire, the performances continue to reflect the social hierarchy through the different classes of puppets (Dowsey-Magog, 1994).

Although stories evolve to incorporate shifting lifestyles in local villages and urban areas, they remain deeply rooted in Southern Thai cultural traditions. The increasing influence of film, television, and technology has contributed to the modernization of Nang Talung while preserving its core essence.

2.2.1.5 The Manipulation Technique

Nang Talung puppets are two-dimensional (2D), with flat figures placed against a white screen and illuminated from behind by a light source such as an oil lamp or an electric bulb. This technique creates shadows, forming the visual imagery that brings the performance to life. The puppets are manipulated by puppeteers, who control their own troupe, craft their own stories, and perform to entertain the audience.

Each puppet has jointed parts, allowing for movement above the waist, including the shoulders, upper arms, and lower arms. The puppeteer skillfully manipulates these joints to bring the characters to life.

Music plays an important role in the performance, acting as an interlude between scenes. It provides time for the performer to rest their voice and reposition the puppets before continuing. Traditional instruments such as drums and cymbals are still used, but modern instruments like keyboards and saxophones have also been incorporated. The ability to shift between different musical styles creates a fast-paced and engaging experience, making the performance more enjoyable and appealing—particularly to younger audiences (Dowsey-Magog, 1994).

Nang Talung continues to exist in modern society because it remains a deeply rooted form of local entertainment, reflecting the values and culture of certain communities (Taweethong, N., 2010). The stories are easily understood by local audiences, requiring only light, a screen, and leather puppets to convey knowledge, ideas, and moral lessons. Traditionally, Nang Talung also served as a medium of communication between the people and the government. Puppeteers were regarded as local philosophers, influencing the thoughts and perspectives of rural communities.

2.2.1.6 Challenges and Adaptation of Nang Talung in the Modern Era

Despite its cultural significance, Nang Talung faces major challenges in contemporary society due to urbanization, the decline of agrarian lifestyles, and competition from modern media.

Urbanization has disrupted the traditional audience base, which historically gathered at rural festivals and communal events. As people migrate to cities, opportunities for performances decrease, and the fast-paced urban lifestyle leaves little room for traditional arts.
The decline of agrarian lifestyles has further reduced Nang Talung's relevance. Many of its themes revolve around agriculture, community unity, and rural traditions—subjects that resonate less with modern audiences as Thailand shifts toward an urban economy.
The decline of rural festivals has limited performance opportunities, weakening Nang Talung's presence in Thai cultural life.
The influence of modern media is perhaps the greatest threat. Television, cinema, and digital platforms provide polished, easily accessible entertainment that overshadows the live, interactive nature of Nang Talung. Many young people see it as outdated, and its traditional moral themes feel disconnected from urbanized youth.

Adaptation and Modernization, to remain relevant, Nang Talung has undergone several adaptations:

- Lighting and Screens – Traditional oil lamps and cloth screens have been replaced with electric lighting and decorative silk screens.
- Musical Instruments – Modern instruments like keyboards and drums now accompany traditional ensembles.
- Puppets and Characters – Puppets have been enlarged, and comedic elements have been added to cater to contemporary tastes.

- Narrative Style – Verse-based storytelling has evolved into dialogue-heavy plots that prioritize entertainment over moral lessons.

While modernization helps expand the audience, it also risks diluting Nang Talung's cultural essence. Therefore, balanced preservation efforts are essential to ensure that it remains a vibrant part of Thailand's intangible cultural heritage. Future efforts should focus on maintaining traditional elements while adapting aspects to attract new generations, ensuring Nang Talung's survival for years to come.

2.3 Generation Gaps

The concept of generation gaps gained significant attention in the 1960s when the Baby Boomer generation began exhibiting behaviors and beliefs that differed from those of their Silent Generation parents (Bolland & Lopes, 2014). Early research proposed various theories on the generational divide (Bengtson, 1970), but later studies suggested that such divides were often exaggerated in certain contexts (Falk & Falk, 2005). However, more recent studies emphasize the importance of re-examining the topic in light of shifting societal norms and evolving intergenerational dynamics (Aggarwal et al., 2017).

The concept of a generation gap originates from the broader idea of a generation, which can be defined as a group of individuals who experience similar stages of human development during the same period (Bolland & Lopes, 2014). While this definition provides a general framework, life experiences can vary significantly based on geographical, cultural, and socioeconomic factors. Additionally, the generation gap refers to differences in attitudes, beliefs, and behaviors between older and younger generations (Bengtson, 1970). These differences often contribute to the formation of a distinct youth culture, characterized by unique norms, values, and habits (Falk & Falk, 2005).

Research on generational gaps frequently examines topics such as workplace dynamics, cultural preferences, and interpersonal relationships. For example, a study by Frits van Wel (1994) explored Dutch teenagers' cultural preferences in music, reading, film, television, art, and recreation. The study found that while adolescents' tastes closely aligned with those of their best friends, there was little evidence of conflict between their preferences and those of their parents. This finding challenges the notion of a "parent-peer" conflict, which suggests that youth tend to distance themselves from parental influence in favor of peer approval.

2.3.1 Generation Gaps in Thai Culture

One significant factor contributing to generational gaps is the declining interest among younger audiences in traditional art forms like Nang Talung. Studies on other traditional Thai performances, such as Hun Lakorn Lek (traditional marionette puppetry), reveal similar trends, where both performers and audiences are primarily older individuals, largely due to a lack of interest among youth (Kaneko et al., 2016). This decline in engagement has also been observed in other traditional arts, including puppetry and classical dance (Pradana & Srisontisuk, 2023; Soongphankhao, Kuntawong, & Khutchan, 2017; Akkapram, 2020).

Efforts to revitalize interest—such as the introduction of modernized Isan puppet plays—have seen some success (Akkapram, 2020). However, these initiatives have had limited reach and have not significantly bridged the generational divide. Addressing this persistent challenge requires broader and more effective strategies.

Generational divides are often shaped by differences in life stages and lifestyles. Sociological research highlights that individuals at different ages experience varying needs, preferences, and constraints (Kelan, 2014). For instance, younger individuals, who are focused on education and employment, often have limited time for leisure activities. In contrast, older individuals, who are financially stable or retired, tend to participate more actively in cultural pursuits (Halba & Bartolucci, 2018).

Urbanization is another major factor contributing to this divide. Younger generations frequently migrate to urban areas for education and employment, physically and culturally distancing themselves from traditional, village-based art forms like Nang Talung (Thongyou et al., 2014). Additionally, urbanization has shifted perceptions of rural life, further weakening connections to traditional practices.

Technology use—particularly differences in internet and social media engagement—also plays a role in generational divides in Nang Talung participation. Although the digital divide has narrowed, inequalities in access and usage persist, particularly among rural and older populations (Van Dijk, 2020; Dalferro, 2022). Younger Thais are more active consumers of digital and social media, while older generations use these platforms less frequently (Doungsuwan & Techawattanasiridumrong, 2021). These disparities likely influence varying levels of engagement with folk media, though this connection remains underexplored in existing literature.

To better understand generational divides in folk media engagement, four key measures were identified: social experience, cultural experience, enjoyment, and learning engagement.

2.3.1.1 Social Experience

Social interaction is a vital component of cultural activities, but expectations for these interactions vary across generations. Older generations tend to value face-to-face communication, while younger generations often prefer digital or entertainment-driven engagement (Siebler, 2016; Calvo-Porral & Pesqueira-Sanchez, 2019).
By observing intergenerational interactions—both online and offline—researchers can better quantify these differences and develop strategies to foster greater engagement across age groups.

2.3.1.2 Cultural Experience

Generational divides are also evident in cultural exchanges, such as storytelling and the transmission of traditional knowledge. Older individuals often have a deeper reservoir of cultural knowledge, while younger generations are more influenced by globalized media and modern education (Ashencaen Crabtree, 2010; Zhang, 2017).

By analyzing these exchanges, researchers can identify effective strategies to bridge generational gaps, ensuring the preservation and continued transmission of traditional practices.

2.3.1.3 Enjoyment

Enjoyment, defined as the pleasure or positive emotions derived from an activity, varies across generations. Younger individuals often associate enjoyment with fun and entertainment, while older generations tend to link it to deeper emotional fulfillment (Kawabata & Mallett, 2022). This research examines how enjoyment influences intergenerational engagement, providing insights into ways to make traditional cultural experiences more appealing to diverse age groups.

2.3.1.4 Learning Engagement

Learning engagement, defined as the cognitive, emotional, and motivational involvement in an activity, provides another perspective for understanding generational divides.
This research employs the Intrinsic Motivation Inventory (IMI) to assess engagement across key dimensions such as interest, perceived competence, and enjoyment (Wilde et al., 2009). While the IMI has been widely applied in various cultural contexts, its use in folk media studies represents a novel contribution to the field.

2.4 Digital Arts Concept and Tools

Digital Arts is an interdisciplinary field that merges creative expression with modern technological tools. It encompasses various digital mediums such as animation, video art, virtual reality (VR), augmented reality (AR), and digital photography to create innovative works that convey artistic, cultural, and societal messages (Paul, C., 2023).
As an evolving field, Digital Arts challenges the boundaries of traditional art forms, offering artists new methods for creation, communication, and interaction. While digital tools play a crucial role, the essence of Digital Arts remains rooted in creativity and artistic expression. This highlights that Digital Arts is not merely the use of technology but a platform for artistic innovation.
The distinction between traditional and digital art is often blurred, as digital tools enhance rather than replace traditional techniques. According to Manovich (2001), Digital Arts is characterized by its use of computers in the creation or dissemination of artworks. While traditional art relies on materials like canvas or clay, Digital Arts leverages pixels, sound, and other digital components to convey meaning. Digital media allows art to transcend its physical form, enabling new avenues for experimentation and audience engagement. Through Digital Arts, artists explore new dimensions of space, time, and narrative, resulting in diverse creative outputs such as 2D and 3D animation, digital photography, game design, and interactive installations.

Moreover, Digital Arts plays a vital role in cultural preservation, particularly in safeguarding intangible cultural heritage (ICH). Digital technology provides effective means for documenting, preserving, and sharing cultural practices and traditions that may otherwise be at risk of disappearing. As a result, Digital Arts serves as a bridge between tradition and modernity, ensuring that cultural heritage thrives in the digital age.

2.4.1 Participatory Design

Participatory design is a collaborative process in which end-users, stakeholders, and communities are directly involved in the design and decision-making stages of a project. This approach is grounded in the belief that those affected by a design should have an active role in shaping its development. Originating from Scandinavian design practices in the 1970s, participatory design was initially used to democratize workplace environments by involving workers in creating solutions that met their needs. In the context of Digital Arts, participatory design enables communities, audiences, and creators to work together in developing digital artworks, ensuring that the outcomes are culturally relevant, inclusive, and reflective of the people they represent (Bødker, 2022).

Participatory design and user-centered design are widely applied in technology-based communication practices. Spinuzzi (2004) emphasized collaboration, co-research, and co-design through participatory design research. He focused on tacit knowledge—skills and understandings developed through work experience. His model consists of three stages: (1) initial exploration of work, (2) discovery processes through workshops and interactive sessions in which participants and researchers define problems and solutions, and (3) prototyping, which involves the development of artifacts. Spinuzzi (2004) stressed that participatory design should be seen as a methodology rather than just a design approach. This perspective allows researchers to build a coherent body of knowledge applicable in fields such as technical communication, human-computer interaction, and workplace studies.

Sanders and Stappers (2008) explored the evolution from user-centered design to co-design and co-creation. While traditional user-centered design positioned users as passive subjects, participatory design redefined users as active partners in the design process. Co-creation refers to any act of collective creativity involving multiple people, whereas co-design specifically focuses on collaboration throughout the entire design process. These concepts are rooted in consumer-driven innovation. In this context, the role of the professional designer shifts from a translator to a facilitator. Integrating co-creation into design practices addresses sustainable environmental and social needs. The evolution toward participatory and user-centered approaches is expected to transform design practices and create new domains of collective creativity.

Smith and Kjærsgaard (2015) examined the role of design anthropology in participatory design, emphasizing its potential to critically address societal challenges in an increasingly digital and globalized world. Their studies include interactive technologies in museums (cultural heritage projects), educational innovations (engaging youth in participatory design), healthcare design (co-creation with elderly people living with dementia), and other social change initiatives. Their work provides a critical lens through which to view participatory design, advocating for an approach that goes beyond traditional ethnography to shape social, cultural, and technological futures. They call for a more holistic and future-oriented methodology.

Besides, the concept of design choices (Rouwette and Franco, 2024) also provides a comprehensive framework for understanding and making crucial decisions that shape the

effectiveness of team decision-support interventions. It emphasizes that carefully considered design choices can significantly enhance the quality of solutions developed by a team. The core conclusion revolves around four interconnected design choices that analysts and clients must make to create conditions for an effective intervention process. Inclusion of Expertise and Stakeholders: Team design should ensure access to relevant knowledge and expertise, involving individuals from appropriate functions or organizations. Crucially, it is advised to include key stakeholders who are both powerful and interested in the problem, as their involvement significantly increases the chances of successful implementation.

Belgrave, Ashlee, et al. (2022) used participatory design to develop sustainable cultural interventions with a Latin American community (n=20). Their research demonstrated that participatory design methodologies that build on the strengths of diverse populations can produce relevant interventions that support community-based learning. To conduct research with culturally diverse communities, it is essential to mutually value participants' cultures and practices. Their participatory approach integrated research, action, and education, allowing the community to play an active role. This study, situated in developmental psychology, showed that participatory design can support children's learning in community settings by creating culturally appropriate interventions.

In Digital Arts, participatory design goes beyond simply gathering feedback or opinions—it emphasizes co-creation, where artists and participants collaborate throughout the creative process. This collaboration leads to meaningful and engaging artworks that reflect community values and concerns. Within the context of cultural heritage, participatory design empowers local communities to take an active role in preserving their traditions in ways that are both respectful and inclusive.

A wide range of tools is used in participatory design, all aimed at facilitating communication, collaboration, and joint decision-making. These include digital co-creation platforms, collaborative software such as Google Docs and Miro, participatory workshops, and even game design tools that allow users to co-create stories or interactive experiences. The chosen tools must be flexible and adaptable to the needs of participants, allowing for creative input from diverse voices. In Digital Arts, technologies such as interactive interfaces, motion-sensing devices, and virtual spaces enable participants to meaningfully contribute to the creative process.

For instance, in interactive installations, participatory tools might include motion-sensing technology or augmented reality (AR) applications that enable real-time interaction with digital artworks. These tools allow users to modify or influence the artwork, effectively making them part of the creative process. In collaborative animation projects, platforms like Toon Boom or Adobe Animate allow teams of creators to co-design characters and storylines, integrating diverse perspectives into the final product.

Participatory design plays a crucial role in Digital Arts, particularly in projects related to social issues, cultural preservation, and interactive storytelling. One of its key advantages is the ability to produce digital content that is not only artistically innovative but also socially and culturally

relevant. It is often used in the creation of digital exhibits, video games, virtual galleries, and interactive performances. By including community members in the design process, these digital works can better reflect local customs, languages, and values, making them more resonant and impactful.

In relation to intangible cultural heritage, this research employs a participatory design methodology to bridge the generational gap by engaging younger generations with traditional art forms through digital media. By involving communities in the creative process, traditional arts such as storytelling, music, and puppetry can be preserved while being adapted to modern technologies. This includes the development of an application designed to sustain and promote cultural heritage.

2.4.2 Tools and Processes of Digital Arts

2.4.2.1 2D Animation

2D animation is one of the most widely used tools in Digital Arts. It involves creating characters and environments frame by frame, often using software such as Adobe Animate or Toon Boom. In the context of cultural preservation, 2D animation can digitally recreate traditional storytelling methods, making them more accessible to contemporary audiences. This medium offers immense flexibility in terms of visual style and narrative, making it ideal for reviving traditional stories and artistic forms.

In cultural projects 2D animation can be used to bring traditional puppetry to life in new, engaging ways. Animation allows artists to enhance the physicality of puppetry by exploring different dimensions, movement, and visual storytelling techniques that would be difficult to achieve in traditional performances. Through animation, traditional art forms can be reinterpreted and modernized, ensuring their continued relevance and appeal to younger generations.

2.4.2.2 Augmented Reality (AR)

Augmented reality (AR) is a powerful tool in Digital Arts, allowing digital elements to be superimposed onto the physical world. This technology creates immersive and interactive experiences that seamlessly blend real and virtual environments.
AR can be used to bring static cultural artifacts to life, provide educational experiences, and engage users in dynamic, interactive storytelling. It is particularly valuable for connecting younger generations with cultural heritage, as it offers an interactive, hands-on approach to learning.

2.4.2.3 Interaction Design Process

Interaction design focuses on creating seamless and engaging user experiences by designing the interfaces through which users interact with digital systems. In Digital Arts, interaction design ensures that users can engage meaningfully with digital works, whether they are navigating an interactive art exhibit, playing a game, or participating in a virtual performance.

According to the elements of user experience (Garrett, 2010), effective interaction design is crucial for creating intuitive and enjoyable experiences that encourage user engagement and interaction.

2.4.2.4 Game Design

Game design combines storytelling, mechanics, and interactive gameplay to create immersive, user-driven experiences. Video games offer unique opportunities for users to engage with stories and traditions in a playful and educational way. They are powerful mediums for storytelling because they allow players to become active participants in the narrative.

One successful example is World of Warcraft (WoW) (Harwood and Garry, 2014), a digital "folk art" created in 2004. The game was powered by purpose-built animation tools (machinima) constructed for popular game engines. It allows players to create character avatars, landscapes, fighting styles, and interact with other players, fostering collaboration throughout the process. The creativity combined with the tools used within the game engine led to its success. By 2014, WoW had over one hundred million registered accounts, earning it recognition as one of the greatest video games of all time.
This massively multiplayer online role-playing game (MMORPG) stands as a testament to innovation within Digital Arts, leveraging a diverse array of digital media and communication tools. This innovative approach highlights the role of game design in digital arts.

Game design can also be used to create digital games that teach players about traditional cultural practices, rituals, and performances. By making cultural heritage interactive and fun, game design has the potential to reach new audiences, particularly younger generations who may not engage with traditional art forms in other ways.

2.5 Related Research on Using Digital Arts Tools in Shadow Play

Several studies have explored the use of Digital Arts tools in the context of traditional shadow play and puppetry. The application of digital technologies in puppetry has given rise to the field of digital puppetry, which combines traditional puppetry with modern digital tools. For instance, Kim and Park (2001) investigated the digitization of Indonesia's Wayang Kulit, while Li and Hsu (2005) used motion planning algorithms to automatically generate Chinese shadow play animation. The character's motion consisted of both primary and secondary movements, allowing for realistic motion generation, though real-time interactivity was not supported. The study also excluded lower body motions during post-processing, which affected the completeness of the movements. In a later study, Li and Hsu (2007) further examined the use of digital media in Chinese shadow puppetry. Both studies show how digital technologies can preserve traditional puppetry while enhancing its expressive potential.

Research by Sturman (1998) focused on technologies like motion tracking and real-time puppet control systems in digital puppetry. These tools enable greater precision and flexibility in puppet manipulation, expanding the expressive possibilities of puppetry beyond the limitations of traditional physical forms. Similarly, Lam et al. (2008) used OpenGL for animation graphics,

applying texture mapping and blending techniques for fast, interactive displays with blurring special effects. This approach provided realistic, interactive, and real-time animation, including the animation of puppet arms. The animator had to render several key frames offline and use commercial software to generate in-between frames, offering more flexibility and real-time interaction.

Ghani (2011) explored how digital media can replicate the aesthetic qualities of traditional shadow puppetry, such as the interplay of light and shadow, while overcoming challenges related to real-time image rendering.

Advancements in digital puppetry have incorporated interaction design and game design principles to create more immersive and participatory experiences. For example, Lam, K. L., and Talib (2010) applied special effects techniques for virtual puppet play. Their research provided solutions for animating shadow puppetry using texture mapping and blending methods, allowing for interactive real-time play. Special effects were applied to enhance the background, suiting the story flow. The researchers suggested improving the accuracy of the vertices in the puppet's design to enhance the display further.

Talib et al. (2012) also used computer graphics to enable interactive play in a real-time environment, producing realistic animations of virtual shadow puppetry. Special effects, such as lighting and blurring, were applied to enhance the visual experience. The use of traditional music, puppets, and brightness adjustments were controlled through a keyboard, offering solutions for visual simulation and animation of virtual puppet play in real time.

The e-Heritage project (Lim, S.L., 2013) used facial recognition technology to enhance Chinese shadow puppet performances. These studies highlight the role of Digital Arts tools in preserving and evolving traditional forms of cultural expression, while also engaging contemporary audiences in innovative and interactive ways.

These studies have employed various approaches, ranging from non-interactive 3D animations (Hendriana, Aziz, and Junaidi, 2016) to complex systems enabling motion capture of puppeteers for game contexts (Hsiao, 2019), to the development of animated shadow play games (Hsiao and Wang, 2020). Some authors have also integrated digital shadow play with other forms of intangible cultural heritage. For example, the ShadowPlay 2.5D project allows users to create 3D animated videos interpreting classical Chinese poetry through traditional shadow play (Zhao and Ma, 2020). This project is noteworthy for being entirely self-guided, making it participatory, and it merges two different forms of folk media. Additionally, the development of the Wayang Fighters game, based on Wayang Kulit shadow play traditions, modernizes the art for a match-fighting game (Ghani, 2015).

Recent studies have explored how digital arts tools, particularly Augmented Reality (AR), can be used to preserve and promote Intangible Cultural Heritage (ICH), including traditional shadow play.

Tong and Kim (2021) investigate the use of AR, big data, and digital management in safeguarding ICH. Their research emphasizes the challenges posed by rapid modernization, which threatens the survival of cultural traditions. To counter this, they propose a digital approach to preservation and engagement, using traditional shadow play as a case study. Their methodology combines data analysis, comparative evaluation, and experimental testing, involving 60 randomly selected participants.

The findings show that AR-based shadow play significantly improves audience engagement across all age groups. Participants appreciated the vivid visuals, color quality, and clarity offered by AR presentations. The technology allowed users to explore the history, types, and performances of shadow puppets through interactive animations and 3D models, replacing the traditional static "image + text" format. The study concludes that AR enhances the appeal, accessibility, and effectiveness of ICH preservation by offering a more immersive experience.

Galani and Vosinakis (2024) focus on using mobile AR to present both intangible and architectural heritage. They developed a system that overlays animated 3D content onto a physical scale model of a traditional building, using Unity and the Vuforia AR platform. The digital content includes traditional tools, characters, and furniture, which help link the architecture to its historical and cultural context.

Their evaluation, using a between-subject design, found that the AR-enhanced model improved visitor engagement, learning outcomes, and ease of use. This suggests that AR has strong potential to be widely adopted in museums or heritage settings, especially for presenting culturally significant buildings and practices in an interactive format.

Bui and Lovell (2024) explore how creative practitioners can use AR to preserve and transmit ICH through their project "Play to Preserve the Past." This project integrates speculative design and interactive gameplay to communicate various elements of Vietnamese culture—such as oral traditions, folk values, and childhood games.

The study outlines several design considerations for AR in cultural heritage, including updating traditional aesthetics, encouraging physical interaction through ritual-like movements, transforming ordinary spaces into meaningful environments, and embedding cultural values into game mechanics. The goal is to create immersive AR experiences that not only entertain but also educate and preserve cultural practices. Their findings offer practical guidance for designers and artists working on cultural preservation in the digital age.

In the context of development and adaptation, "Transcoding Nang Talung: An Animated Adaptation of Thai Shadow Play" (Hetayothin, 2016) aims to combine traditional Nang Talung shadow puppetry with modern computer animation to preserve and reinterpret this cultural heritage. Using the animated short film NUNUI (2013) as a case study, the process involved adapting the aesthetic and narrative elements of Nang Talung while utilizing digital tools like Photoshop, Flash, and After Effects. This adaptation focused on enhancing style rather than dialogue. The outcome demonstrates how merging tradition with modernity can create unique animation styles and preserve cultural identity in contemporary contexts. The study emphasizes

integrating cultural roots into modern animation to innovate while preserving heritage. It also explored new ways to experiment with the movement of Nang Talung puppets, adding joints for greater mobility in the lower parts (ankles, knees, legs) while retaining the traditional upper joints (shoulders, upper and lower arms). The movement of each part broke traditional approaches, replacing dialogue with gestural expression. Thus, NUNUI (2013) is a complete animated short film that represents an animated adaptation of Nang Talung.

Hetayothin (2016) highlights how transcoding, rather than simply replicating traditional art in a new medium, should emphasize both the similarities and differences between the original material and its resulting animation. The animated short film NUNUI (2013) serves as a case study of this adaptation process.

Other scholars, such as Dowsey-Magog (2002), have analyzed how the traditional Thai shadow puppet theatre, Nang Talung, has evolved in its artistic, cultural, and socio-political contexts. It has transitioned from rural entertainment to a medium reflecting modern societal changes and challenges. Dowsey-Magog's study involved historical and cultural analysis of Nang Talung, field observations of performances, and interviews with performers and audiences. It explored how modern societal changes and challenges have been integrated into the art form.

The study highlighted the hybrid nature of modern Nang Talung, where traditional elements coexist with contemporary influences like modern music, dialogue, and technology. Performers adapt their content to appeal to both rural and urban audiences, reflecting local identities while addressing current societal issues. The findings emphasize Nang Talung's role as a dynamic cultural medium that preserves regional heritage while evolving to stay relevant. It bridges traditional and modern worlds, offering a platform for cultural expression and social commentary. This study provides valuable insights for cultural preservationists, educators, and policymakers on how traditional art forms can adapt to modernity and serves as a reference for developing innovative approaches to integrating heritage with contemporary media.

As a consequence of urbanization, Nang Talung has expanded its political and commercial significance. Local audiences refer to performances as Nang Boran (Ancient Nang) and Nang Samai (Modern Nang), reflecting the flexible continuum between the two ends of tradition and modernity (Dowsey-Magog, 2002). This distinction applies to both storylines and structures, as well as performance and music.

Stories and Structure:
The stories in Nang Talung typically begin with the start of a journey, with the major part of the plot focusing on ongoing adventures. The narrative often reflects the feudalistic social system and the belief in karma. In contrast, modern versions of the stories focus on current social changes and everyday interests.

Nang Talung performances closely follow societal transitions, representing a culture that is neither fully grasping the modern world nor entirely relinquishing the old order. As a result, the clown characters, often associated with the lower rural classes, play a prominent role.

Music and Dialogue:
Music, often accentuated by drums and cymbals, is used to emphasize commands, anger, punchlines of jokes, fights, and chases.

Dowsey-Magog (2002) describes the clown characters, such as Teng, Nui, Yodthong, and Kaew, who employ humor and sexual innuendos to entertain audiences. These clowns use seductive music to attract attention and often make suggestive comments, accompanied by drumming and cymbals. Audiences typically enjoy the performance until late into the night.

Although Nang Talung is often seen as coarse entertainment, its use of the southern dialect, with its slang and idioms, contributes to its reputation. The southern dialect has seven or eight tones, compared to the central Thai dialect, which has five. The clown Samoh character, wearing a Muslim hat and carrying a red-tipped pestle or club, is a phallic symbol signifying Muslim circumcision.

The absurdity of clowns using a mobile phone while walking with a princess illustrates the contradiction between modern urban and rural life. Clowns often break the historical frame of the stories, satirizing its use by authorities, such as the police. This juxtaposition between modern and traditional life is also evident in the competition between outdoor cinemas and Nang Talung performances at fairs.

In their work on the distribution between folklore and literature, Jakobson and Bogatyrev (1966) argue that, unlike literature, folklore is oriented toward langue (the system of language) rather than parole (individual speech acts). This means that a work of folklore does not truly exist until it has been adopted by a community. Any elements that are not accepted by the community will eventually "die out." They emphasize that folklore is extra-personal, existing only as a potential realized by each performer, similar to how individual speakers realize the potential of langue. This perspective highlights the collaborative and evolving nature of folklore, which is constantly shaped and reshaped by the community.

The study "Relevance of the Textual and Contextual Analyses in Understanding Folk Performance in Modern Society" (Koanantakool-Chalermpow, 1989) investigates the Southern Thai shadow puppet theatre, Nang Talung, to understand how folk performances adapt to social and technological changes while retaining their traditional essence. The research, based on fieldwork conducted in 1976-77 and 1982, involved observing performances and interviewing puppeteers.

The analysis covers both textual elements (e.g., puppet design, narrative structure) and contextual factors (e.g., commercialization and socio-cultural roles). Key findings show that Nang Talung remains dynamic, incorporating modern themes and technologies, such as microphones and contemporary characters, while retaining traditional features. Two puppeteers, Nang Kan and Nang Phrom Noi, exemplify contrasting styles: one as a moral instructor and the other as an entertainer, reflecting their socio-economic contexts.

This study highlights the adaptability of folk arts in balancing tradition and modernity, offering insights into cultural preservation and the interaction between art and society. It provides a framework for understanding how cultural heritage can thrive in changing environments.

While these studies show a growing interest in digital shadow play, many projects remain relatively simple, focusing mainly on program design rather than undergoing extensive usability testing. As a result, there is limited in-depth information on how digital shadow play tools can be developed, tested, or how these tools influence the understanding of or interest in traditional shadow play.

In conclusion, the integration of digital arts tools and participatory design concepts offers significant potential for the preservation and modernization of traditional cultural forms. By leveraging tools such as 2D animation, AR, interaction design, and digital puppetry, traditional art forms can be transformed into interactive, immersive experiences that resonate with modern audiences while preserving their cultural significance. Through participatory design, communities can actively contribute to the preservation and dissemination of their cultural heritage, ensuring that these traditions continue to thrive in the digital age.

2.6 Assessment Approaches for Participatory Design

2.6.1 The Usability Questionnaires

The usability of the Digital Nang Talung was measured using a 10-item questionnaire adapted from established system usability instruments (similar in structure to the System Usability Scale). The purpose of this questionnaire was to assess how participants perceived the application in terms of ease of use, clarity, confidence, and overall system complexity.

Each item was rated on a **5-point Likert scale**:
1 = Strongly disagree
2 = Somewhat disagree
3 = Neutral
4 = Somewhat agree
5 = Strongly agree

The questionnaire includes statements about participants' experiences while using the system, such as whether it was easy to use, whether instructions were clear, whether they felt confident using it, and whether they needed assistance.

Overall, the instrument evaluates three main aspects of usability:
1. **Ease of use and learnability** - how simple the system is to understand and operate.
2. **User confidence and independence** - how comfortable and self-sufficient users feel while interacting with the system.
3. **System clarity and technical reliability** - whether the system functions clearly and without confusion or errors.

By covering these dimensions, the questionnaire provides a comprehensive measure of how effectively participants were able to interact with the Digital Nang Talung.

2.6.2 Knowledge, Attitudes, and Practices (KAP) Scale

The Knowledge, Attitudes, and Practices (KAP) model provides a structured approach to understanding how individuals perceive and engage with specific topics. A KAP survey is defined as "a representative study of a specific population to collect information on what is known, believed, and done in relation to a particular topic" (World Health Organization, 2008, p.6). In the context of a KAP survey, "knowledge" refers to an individual's understanding of the area being studied, "attitudes" pertains to their beliefs and perceptions about the subject, and "practices" describe the actions they take in relation to the phenomenon being investigated (Jacobsen, 2017). KAP surveys can be used to identify existing attitudes and beliefs, highlight knowledge gaps, or track changes in attitudes and behaviors over time (World Health Organization, 2008).

KAP surveys are commonly used in health settings to assess individuals' understanding and behaviors regarding health-related topics, either for individual educational purposes or for public health initiatives (Jacobsen, 2017). However, Launiala (2009) critiques KAP surveys as insufficient for capturing the full complexity of attitudes and day-to-day practices, particularly in culturally sensitive contexts such as malaria in pregnancy in Malawi. This underscores the risk of relying solely on decontextualized survey data without integrating qualitative insights. Similarly, Bolarinde et al. (2020) demonstrate that although healthcare workers may possess adequate knowledge (K) and positive attitudes, these do not always translate into consistent practice, revealing a gap between cognitive understanding and embodied application. In contrast, Sirijoti et al. (2014) show that insufficient knowledge often leads to inappropriate attitudes and practices, emphasizing the critical role of the knowledge component in shaping behavior and public health outcomes.

In recent years, there has been growing interest in applying the KAP model to cultural heritage activities. For example, a study by Juanis et al. (2022) used the KAP model to assess the attitudes of Malaysian youth towards intangible cultural heritage, demonstrating how KAP surveys can evaluate cultural heritage engagement. Similarly, Surata and Vipriyanti (2018) applied the KAP model to assess the traditional Balinese subak village as an educational setting for environmental learning.

The broader sociological discussion in Animated Bodies in Immunological Practices (Bischur, 2011) further enriches this perspective by framing practice as an embodied process, where knowledge is not merely cognitive but enacted through bodily engagement, cultural patterns, and emotional attachments. In this sense, KAP surveys when combined with participatory or ethnographic approaches can move beyond being simple data collection tools to function as mechanisms for embodied learning and engagement. By prompting participants to reflect on what they know, how they feel, and what they do, KAP surveys initiate self-assessment and awareness, bridging the gap between abstract knowledge and lived practice.

In summary, while KAP surveys alone are limited in capturing nuanced practices, integrating them into multi-method designs and participatory frameworks can transform them into tools that foster embodied learning, particularly when the knowledge (K) component is positioned as a foundation for reflection, behavioral change, and deeper engagement with the cultural or scientific domain under study.

2.6.3 Learning Engagement

Learning engagement in participatory design refers to the active involvement of individuals in the learning process, particularly when they contribute to the development, modification, or implementation of a system, artifact, or cultural practice. In the context of digital arts and cultural heritage preservation, engagement is essential for ensuring that participants, particularly those from the target communities, are actively involved in the preservation and evolution of their cultural heritage.

To assess learning engagement, the Intrinsic Motivation Inventory (IMI) has been commonly used. The IMI evaluates participants' intrinsic motivation, interest, and perceived competence in relation to a specific activity (Ryan and Deci, 2000). This scale consists of multiple dimensions, including interest/enjoyment, perceived competence, effort/importance, and perceived choice. These dimensions provide insights into how participants engage with the project, whether they feel motivated by the activity, and how much they believe they are contributing to the process.

The IMI Inventory allows researchers to measure these aspects of engagement in a structured way, enabling them to track participants' intrinsic motivation and identify areas where engagement can be increased. Understanding how participants engage with digital tools in preserving their cultural practices is crucial for ensuring that the resulting digital products are not only functional but also meaningful and relevant to the communities involved. In addition, these assessments help identify barriers to participation, such as lack of perceived competence or interest, which can be addressed to enhance the overall participatory experience.
In conclusion, the combination of tools such as The Usability Questionnaire, The KAP, and IMI may allow for a comprehensive assessment of participatory design processes. These tools offer insights into system usability, community attitudes and behaviors, and the level of engagement and motivation of participants in preserving and promoting their cultural heritage.

2.7 Theoretical Framework

Based on a previous literature review, this study is grounded in the integration of Digital Arts as a strategy to bridge generational gaps and enhance the preservation of Thai traditional folk media, specifically Nang Talung. The framework draws on the interplay of three primary concepts: Thai traditional folk media, the generation gap in Nang Talung, and Digital Arts as a bridging strategy. The three concepts establish the foundation for theorizing how participatory and interactive approaches in Digital Arts can sustain cultural heritage while fostering intergenerational connections.

1. Nang Talung: Thai Traditional Folk Media

Nang Talung is a form of shadow puppetry deeply rooted in Thai cultural heritage. As a form of folk media, it contrasts with mass media, being non-standardized, community-centric, and intended for smaller audiences. Despite its cultural significance, Nang Talung faces challenges in maintaining its popularity due to shifts in audience preferences and the increasing dominance of modern entertainment forms. This tension between continuity and change calls for innovative strategies to preserve its value while adapting it to contemporary contexts.

The theoretical underpinning here is the recognition of Nang Talung as an intangible cultural heritage. This heritage requires safeguarding, not only as an artifact of the past but as a living tradition capable of evolving to meet the needs of modern audiences.

2. The Generation Gap in Nang Talung

Generational differences present a significant barrier to the sustained engagement with Nang Talung. These gaps arise from:

- Lifestyle changes driven by urbanization, with younger generations often moving to cities for education or work, distancing them from traditional village settings.
- Evolving societal values and entertainment preferences, with younger audiences gravitating towards modern, digital, and interactive media.
- Differences in learning and communication styles, which influence how older and younger generations perceive and interact with Nang Talung.

The framework assumes that the generation gap stems from varied social experiences, cultural exposure, and media consumption habits. This gap must be addressed to ensure that Nang Talung remains relevant to both older and younger audiences.

3. Digital Arts as a Strategy for Bridging the Gap

Digital Arts offer a transformative approach to reimagining Nang Talung. By employing participatory design and interactive tools, Digital Arts can modernize this traditional art form while maintaining its cultural essence.

3.1 Participatory Design

Participatory design emphasizes collaboration across generations to foster shared ownership and mutual understanding:

Shared ownership: By involving participants of all ages in the co-creation process, the sense of community and responsibility for Nang Talung's preservation increases.
Mutual understanding: Intergenerational collaboration allows for the exchange of knowledge, blending the traditional expertise of elders with the technical skills and innovative ideas of younger participants.

3.2 Interactive Tools for Digital Nang Talung

Interactive technologies can modernize the presentation of Nang Talung and engage diverse Audiences:

2D/3D Animation: Visual storytelling through animation makes Nang Talung accessible and appealing to younger audiences familiar with digital media.
Interactive Games: Games provide an engaging platform for exploring the stories, characters, and cultural significance of Nang Talung in a fun and collaborative manner.
Augmented Reality (AR): AR introduces digital elements to traditional Nang Talung

performances, such as replacing holding sticks with AR markers, creating an immersive experience that bridges the gap between traditional and modern forms.

4. Proposed Theory: Digital Nang Talung as a Bridge

This framework proposes a theory that Digital Arts, implemented through participatory and interactive methods, can bridge the generational gap while revitalizing Nang Talung. Specifically, this theory suggests that:

Engagement in digital Nang Talung activities enhances the Knowledge, Attitudes, and Practices (KAP) of participants across generations.
Collaborative digital design fosters cultural understanding, shared ownership, and relevance for Nang Talung in a modern context.
Interactive tools ensure that Nang Talung remains engaging and adaptable to evolving cultural preferences.

By synthesizing the concepts of traditional media, generational differences, and digital innovation, this framework establishes a pathway for testing the hypothesis that Digital Arts can revitalize Nang Talung. It underscores the importance of cultural adaptation through participatory design and interactive tools, fostering intergenerational engagement and preserving Nang Talung as a cherished intangible cultural heritage for future generations. This theory sets the stage for empirical investigation into the effectiveness of the proposed strategy. (Figure 2.1)
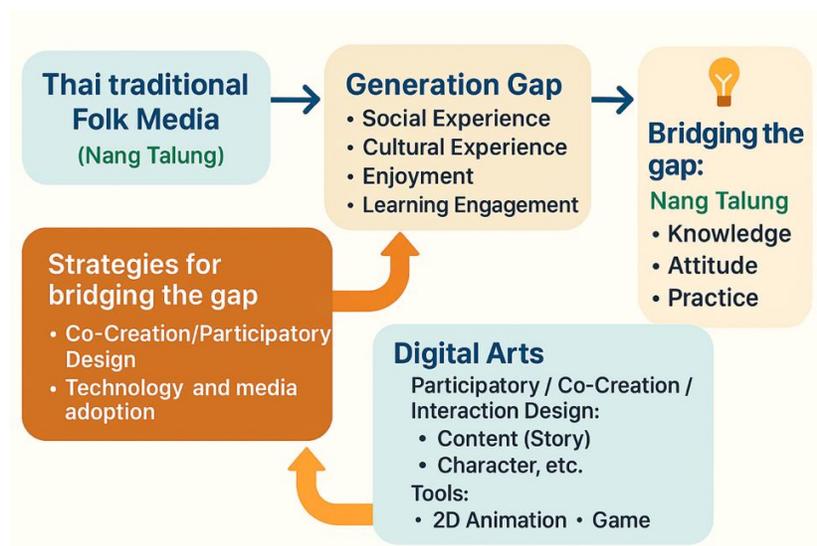
Figure 2.1 Theoretical Framework for The Research Study

2.8 Research Gap

Seven key research gaps emerge from the literature reviewed, highlighting areas where further investigation is needed, particularly in the context of preserving and modernizing Nang Talung through digital arts.

1. **Evidence Gap:** While there is a growing body of research around the use of digital arts to communicate and transmit intangible cultural heritage, there is relatively little research that directly investigates the specific capabilities of digital arts in this domain or how these tools can be effectively applied. Many studies focus on digital tools as communication mediums but do not fully explore how these tools can be optimized for preserving traditional cultural practices, such as Nang Talung. For instance, projects like Hetayothin's (2016) "NUNUI" animation and Li and Hsu's (2005, 2007) digital Chinese shadow play explore the visual and narrative possibilities of shadow puppetry in digital form, but stop short of investigating how such tools preserve the deeper cultural essence or social function of the performance tradition. Additionally, Sturman (1998) and Lam et al. (2008) have demonstrated how digital tools can increase technical precision, but they focus more on simulation and effects than on long-term cultural transmission. This leaves a gap in understanding how digital technologies can both retain the authenticity of cultural practices and make them accessible and engaging for contemporary audiences.

2. **Knowledge Gap:** One significant gap in the literature is the lack of research on how digital tools can bridge generational divides in relation to cultural heritage. While there is some research on generational gaps in workplace and consumer contexts, the application of these approaches to cultural heritage, especially intangible cultural heritage like Nang Talung, has not been thoroughly explored. Studies such as Tong and Kim (2021), who used AR to present shadow play in a way that appealed to participants of various ages, show potential, yet they stop short of analyzing how digital tools can facilitate intergenerational co-creation or engagement. Similarly, Hsiao and Wang's (2020) educational game adaptation of shadow play shows a promising direction for younger audiences but does not address how elders or traditional performers are included. Research is needed to explore how digital arts tools can foster mutual understanding and intergenerational collaboration, ensuring that cultural heritage is preserved for and by future generations.

3. **Practical Knowledge Gap:** There is a lack of in-depth studies on the development of digital shadow play, particularly in the context of Southeast Asian traditions like Nang Talung. Although several digital puppetry projects exist, such as Lam & Talib's (2010) and Talib et al.'s (2012) real-time digital puppet systems, most studies are experimental or limited to proof-of-concept prototypes. Few have addressed how to design culturally sensitive and sustainable digital systems that reflect Southeast Asian puppetry traditions. For instance, Ghani's (2015) "Wayang Fighters" and Zhao and Ma's (2020) ShadowPlay 2.5D offer gamified or artistic reinterpretations of shadow play, but their methods are not standardized or replicable in heritage preservation contexts. Moreover, most of these projects overlook the specific cultural, visual, and performative features

that define Nang Talung. This gap points to the need for more focused research on creating and testing digital shadow play tools that are culturally appropriate and effective in engaging different age groups, particularly in the preservation of Nang Talung.

4. **Methodology Gap:** Few studies have followed the development of digital shadow play tools all the way through to the evaluation stage, especially in terms of assessing how these tools impact the cultural practices they aim to preserve. Most works, such as those by Lam et al. (2008) and Li and Hsu (2005), focus on technical implementation without structured evaluation of user experience or educational impact. Even projects that incorporate interactivity or AR—such as Galani and Vosinakis (2024) and Bui and Lovell (2024)—tend to report short-term findings without long-term assessment of cultural transmission outcomes. There is limited research on how to assess the effectiveness of digital shadow play tools in terms of educational outcomes, user engagement, and preservation of cultural knowledge. This gap calls for the development of robust methodologies for evaluating the success of digital tools in the preservation of intangible cultural heritage, particularly in terms of how they facilitate generational transmission.

5. **Empirical Gap:** There is insufficient empirical evidence regarding how digital shadow play can be used to overcome generational divides in cultural heritage. While some studies, like Tong and Kim (2021), provide initial data on AR's appeal across age groups, and Hsiao (2019) applies motion capture to engage younger users, few studies empirically examine how these tools affect learning, engagement, and cultural perception among different age groups. Research that does examine youth engagement—such as Ghani's (2015) game-based approach—often prioritizes entertainment over cultural learning. What remains missing is a systematic exploration of how digital shadow play can be strategically designed to foster intergenerational knowledge exchange and mutual understanding. This gap underscores the need for more empirical studies that assess real-world usage of digital tools in preserving Nang Talung.

6. **Impact on Knowledge, Attitudes, and Practices:** Another gap in the literature is the lack of research on how digital shadow play tools, such as interactive games or augmented reality applications, can influence knowledge, attitudes, and practices regarding cultural heritage. For example, while Bui and Lovell (2024) introduced a speculative AR design aimed at making ICH more interactive and ritualized, there was little measurement of how this impacted users' perceptions or values. Similarly, Zhao and Ma (2020) demonstrated a compelling interactive poetic shadow play experience but did not assess whether users were more likely to value or engage with traditional forms afterward. Research is needed to assess how digital tools, including games and interactive media, can effectively change how younger generations perceive and interact with traditional practices like Nang Talung, which are at risk of being lost in the digital age.

7. **Population Gap:** There is a significant lack of studies that specifically focus on Nang Talung. Although it is an important cultural tradition in Thailand, particularly in the

southern region, little scholarly attention has been given to its digital transformation. In contrast, other forms of shadow play, such as Wayang Kulit in Indonesia and Chinese shadow puppetry, have received more academic interest (e.g., Kim & Park, 2001; Ghani, 2011; Hetayothin, 2016). Nang Talung—despite its unique cultural identity—remains largely under-researched in the context of digital arts. Apart from Hetayothin's animation NUNUI (2013) and anthropological studies like those by Dowsey-Magog (2002) and Koanantakool-Chalermpow (1989), there is little academic exploration into how Nang Talung can be digitally transformed or revitalized. More research is needed to investigate how digital technologies can help preserve this tradition and make it meaningful and engaging for younger, tech-savvy audiences. This presents an opportunity to bridge generational gaps and ensure that Nang Talung continues to thrive in the digital age.

Conclusion

The research gaps outlined above highlight areas where further investigation is needed to better understand the potential of digital arts tools in preserving and modernizing traditional cultural practices like Nang Talung. Bridging the generation gap through digital tools represents a critical opportunity to ensure that intangible cultural heritage is preserved, while also making it accessible and engaging for future generations. Through targeted research, we can develop effective digital tools that not only preserve the cultural significance of Nang Talung but also engage younger audiences, ensuring the longevity of this important cultural practice.

2.9 Chapter Summary

This chapter reviewed key theories and empirical research related to the research questions, focusing on the concept of folk media, generation gaps in participation in folk media, the use of digital tools to encourage participation in folk media, and the state of digital shadow play as a form of digital folk media. The review identified several theoretical gaps, particularly in how Digital Nang Talung can be developed to promote continued participation from both traditional puppeteers, who are essential for passing on the art's traditional stories, songs, and conventions, and from younger generations, who may become interested in preserving and contributing to this traditional performance art.

While there has been progress in adapting digital shadow play to modern contexts, such efforts have not yet been applied to Nang Talung in a way that fosters participation across generations and encourages continued performance and enjoyment of the art. This gap in the literature provided the foundation for this study, which was conducted using a participatory action research methodology to explore how digital tools could bridge the generational divide and revitalize interest in Nang Talung.

Chapter 3 : Research Methodology

3.1 Introduction

This chapter outlines the research methodology, organized into four distinct studies. It begins with an overview of general methodological considerations, including the research paradigm, approach, design, and process. Following this, each of the next four sections discusses the research methods specific to each phase of the study.

3.2 Research Methodology

3.2.1 Research paradigm

The overarching research paradigm used in this study is pragmatism. Pragmatism addresses research questions where practical outcomes are the most relevant factor (Morgan, 2014). Based on the "pragmatic maxim," this paradigm focuses on the practical consequences of specific actions as the primary points of relevance (Legg & Hookway, 2021). Pragmatism was selected over other paradigms, such as interpretivism, because the researcher's main focus was on the practical outcomes of the study—the development of a Digital Nang Talung application to enhance accessibility and engagement.

The research reasoning pertains to the connection between theory and observation (Malhotra, 2017). This study adopts an abductive research strategy, which seeks to describe occurrences and explain why they happen through cycles of observation and attempted explanations (Malhotra, 2017). Abductive reasoning, as illustrated in Figure 3.1, begins with a series of incomplete predictions, followed by hypothesis formation and testing (Dudovskiy, 2022). It can be applied iteratively, generating increasingly accurate predictions through repeated observations (Dudovskiy, 2022). Therefore, abductive reasoning was the most appropriate choice for this study, which required iterative stages of inquiry and development.
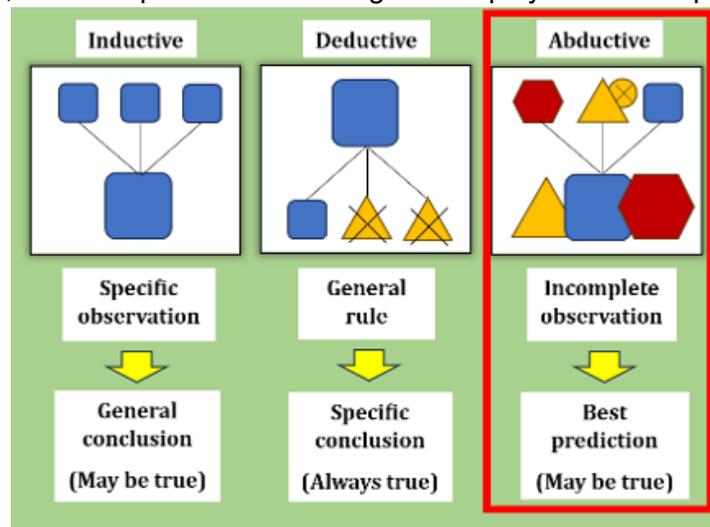
Figure 3.1 Abductive reasoning compared to other forms of research reasoning

3.2.2 Research approach

The research approach combines various types of research into an overarching design. The three primary approaches include qualitative, quantitative, and mixed-methods research (Creswell & Creswell, 2023). Qualitative research involves non-standardized, flexible data collection and analysis methods to deeply explore real-world experiences (Blaikie & Priest, 2017). In contrast, quantitative research relies on standardized techniques to quantify phenomena, answering questions about their frequency and relationships to other phenomena (Creswell & Creswell, 2023). Mixed-methods research integrates both qualitative and quantitative techniques to address varied research questions, offer multiple perspectives, or build and test theories (Creswell & Plano Clark, 2018).

These approaches may be mono-method (using a single method) or multi-method (using two or more methods) (Saunders, Lewis, & Thornhill, 2023). This study generally employed a mixed-method approach, with multiple methods in the qualitative stages. Mixed-method and multi-method approaches aligned well with the pragmatic research paradigm, allowing the researcher to consider diverse viewpoints from Thai youth and Nang Talung puppeteers while examining different types of knowledge. This flexibility made it possible to explore the subject from multiple perspectives.

3.2.3 Research design

The research design for this study is classified as action research, also known as participatory action research (PAR). This approach is commonly used in fields like healthcare, education, and political engagement to involve stakeholder groups in the research process (McNiff & Whitehead, 2011). Action research is distinct from other research forms due to the researcher's active involvement in ongoing activities (Blaikie & Priest, 2017). In this context, part of the research entails the practical development of the Digital Nang Talung application.

A fundamental characteristic of action research is its participatory nature, which emphasizes collaboration with stakeholders rather than merely conducting research on their behalf (McNiff & Whitehead, 2011). This study employs action research because the researcher believes that Nang Talung, as a part of Southern Thailand's intangible cultural heritage, should actively involve present and future generations. While it might be feasible to create a Digital Nang Talung game using only existing sources, doing so would not honor the heritage and traditions it represents, nor would it effectively engage younger audiences.

Thus, the active involvement of both young Thai individuals inheriting the Nang Talung tradition and older practitioners currently practicing it is crucial. This necessity makes action research the most suitable approach for this study.

3.2.4 Research process

The research process is structured into four stages, as shown in Figure 3.2. Each stage addresses a different research question and employs distinct methods. The Pilot Study is based on preliminary survey findings, and from there, each stage builds cumulatively on the previous one.

The final output of each stage includes:
1. A deeper understanding of Nang Talung and digitization issues.
2. A draft design of the application and character development through participatory design and co-creation (Study I)
3. The initial version of Digital Nang Talung with testing of its effects on participants' knowledge, attitudes, and practices (KAP) (Study II).
4. The validation of Digital Nang Talung's potential to bridge generational gaps (Study III).
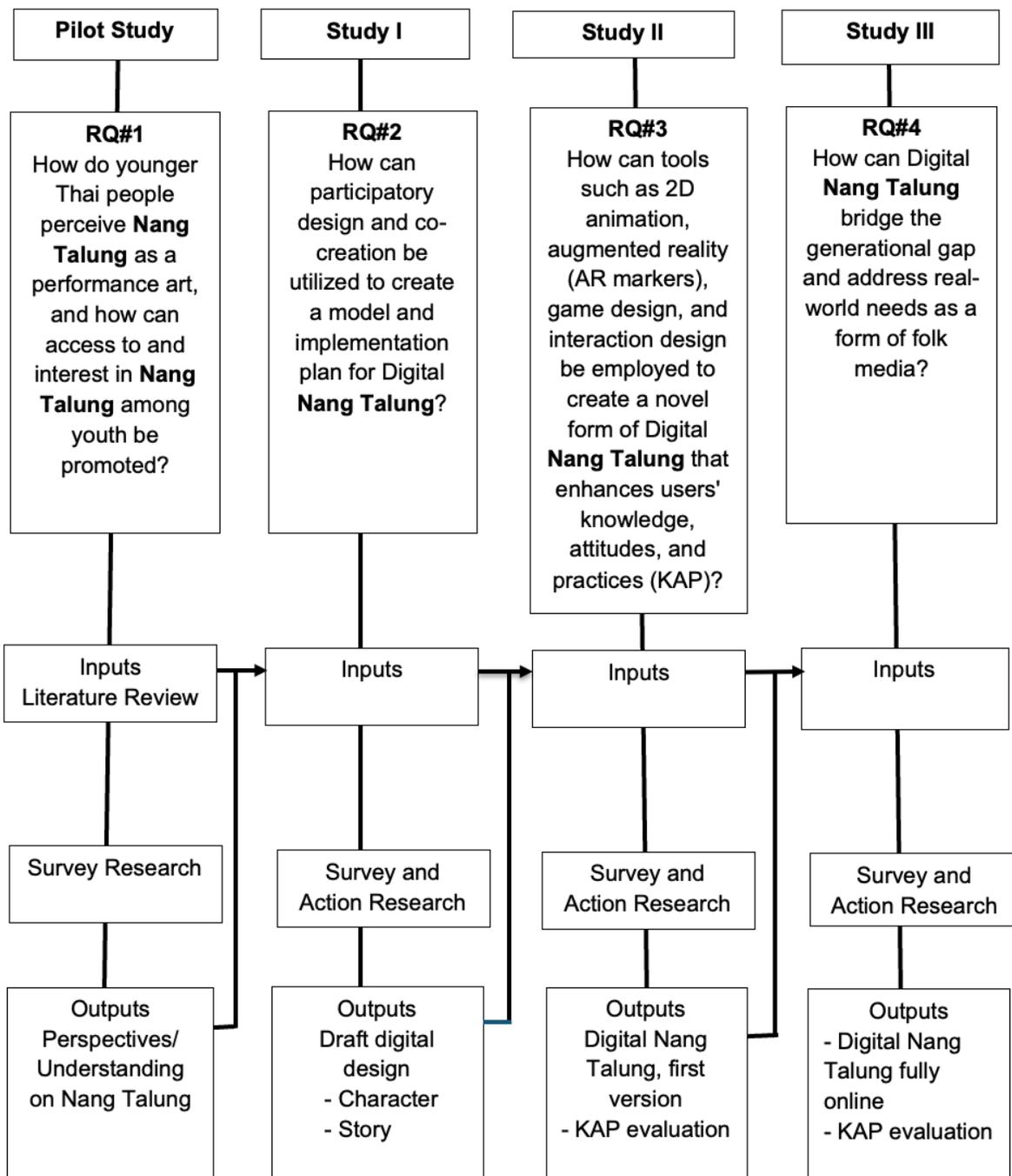
Figure 3.2 The research process

3.3 Pilot Study

The pilot study serves as the preliminary survey of the research, focusing on the RQ1: **How do younger Thai people perceive Nang Talung as a performance art, and how can access to and interest in Nang Talung among youth be promoted?**

3.3.1 Study aim and design

The aim of the pilot study is to examine the current status of traditional Nang Talung among young people in Southern Thailand. This stage uses a pragmatic research design, prioritizing the knowledge gained over strict adherence to specific methodologies (Legg & Hookway, 2021).

A survey research method is selected, featuring both open-ended and closed-ended questions (Fowler, 2014). The survey's purpose is to collect and analyze perspectives on Nang Talung, aiming to understand youth attitudes toward this art form.

3.3.2 Population and sample

Purposive sampling is employed to gather data from young adults (ages 18 to 22) enrolled in the Digital Media program at Prince of Songkla University (PSU) International College (Hat Yai Campus). With enrollment around 400 students in the 2018 academic year, a recruitment notice is shared via Facebook and Line groups to reach students willing to participate in the study.

3.3.3 Data collection

Data collection is conducted through an online questionnaire distributed via Google Forms. Respondents access the form through recruitment announcements shared on social media. The questionnaire (included in Appendix A.1) is designed by the researcher based on a literature review and will undergo tests for content validity and reliability.

The questionnaire consists of four parts:
1. General demographic information
2. Daily media use
3. Opinions and experiences related to Nang Talung. Questions are primarily structured as closed-ended categorical items
4. Open-ended items included to gather participants' opinions on Nang Talung and its digitization.

3.3.4 Data analysis

The data analysis relies on descriptive statistics to summarize and organize data, revealing patterns and insights about participant responses (Holcomb, 2017). Descriptive statistics in this context include frequency distributions, percentages, measures of central tendency (e.g., mean), and measures of variability (e.g., standard deviation), which represent the spread or dispersion of the data. Measures of relative position, such as percentiles, describe the location

of specific values within the dataset. Graphical methods, such as charts and histograms, are also used to visually represent data distributions.

For open-ended questions, open coding is applied. Open coding allows categories to be derived directly from the data (Tracy, 2020), ensuring that the analysis is grounded in participants' actual responses.

3.4 Study I: Participatory Design and Co-Creation for Digital Nang Talung

Study I builds on insights from the Pilot Study and literature review related to traditional shadow play and digital arts theory to design a model for Digital Nang Talung. It applies principles of participatory design and co-creation, engaging participants in developing a digital version of this traditional art form. The purpose of this study is to address RQ2: **How can participatory design and co-creation be used to create a model and implementation plan for Digital Nang Talung?**

The study takes place at Prince of Songkla University (PSU) International College (Hat Yai Campus), where participants are engaged in collaborative design processes to ensure that the model reflects diverse perspectives and remains culturally authentic.

3.4.1 Study aim and design

The aim of Study I is to apply participatory design and co-creation principles to develop shadow play models and a digitization process for Digital Nang Talung. Central concepts include folk media, communication, co-creation, and participatory design, drawing input from both young people and traditional puppeteers. This study builds on insights from the Pilot Study, integrating theoretical perspectives and fostering a knowledge exchange among participants in the co-design process. The intended outcome is a Digital Nang Talung model that uses digital arts and technology to make Nang Talung more accessible to a broader audience.

The research design for Study I follows a multi-method qualitative approach, combining diverse data sources and analysis methods to explore various aspects of the research question (Creswell & Creswell, 2023). Like the Pilot Study, this research adopts a pragmatic paradigm, emphasizing practical outcomes over strict methodological adherence (Legg & Hookway, 2021). Framed as action research, the study prioritizes achieving specific goals, moving beyond mere observation of outcomes (Blaikie & Priest, 2017).

The action research process begins with researchers proposing five draft models. Models 1 through 4 retain traditional Nang Talung features, where puppeteers manipulate the puppets while young participants interact by sending images to a projector. Model 5 is fully digital, allowing participants to use their own devices (computers or mobile) to engage with the content (Figure 3.3). Through participatory design and co-creation in a workshop setting, participants will interact with these models, leading to a draft model, character designs, and the selection of traditional stories for further study

	Proposed Draft Model	Components
1	Model 1	**Technology:** Projector, computer/mobile, screen **Content:** Traditional stories with still images **Actor:** Puppeteer, User
2	Model 2	**Technology:** Projector, computer/mobile, screen **Content:** Traditional stories with moving images **Actor:** Puppeteer, User
3	Model 3	**Technology:** Projector, computer/mobile, screen **Content:** Animations **Actor:** Puppeteer, User
4	Model 4	**Technology:** Projector, Computer or mobile device screen **Content:** Interactive animation **Actor:** User(s) + Puppeteer
5	Model 5	**Technology:** Computer or mobile device **Content:** Interactive animation **Actor:** User
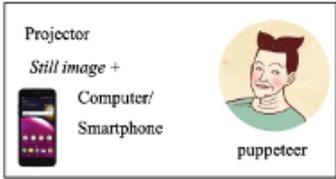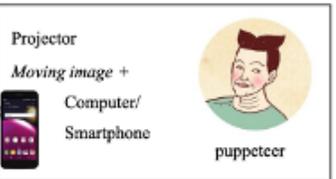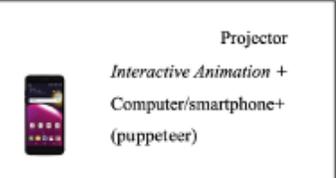
Figure 3.3 Five Proposed Draft Models for Digitized Nang Talung

3.4.2 Population and sampling

The study utilizes purposive sampling to draw samples from two distinct groups. The first group consists of Thai students aged 18 to 22 who are enrolled in the Digital Media BSc program at Prince of Songkla University International College (Hat Yai Campus). The second group includes traditional expert puppeteers, representing an older demographic with extensive knowledge and experience in the domain of interest (Van Audenhove & Donders, 2019).

Both groups are selected using purposive sampling due to their availability, interest, and willingness to participate in the study. This technique is particularly effective for targeting specific populations that are relevant to the research objectives, allowing for a deeper understanding of the perspectives and insights of both young people and traditional practitioners in the context of Digital Nang Talung.

This approach ensures that the research captures a wide range of viewpoints, enhancing the quality of the data collected and contributing to the study's overall goals.

3.4.3 Data collection

The data is collected from the samples through various methods. Participants attend the workshop and data collected by focus groups, in-depth interviews, and design workshop.

3.4.3.1 Focus groups

The first stage of data collection involves focus groups, which serve as group interviews designed to discuss specific topics and gather feedback through moderated group discussions (Barbour, 2018). A small group of participants is selected based on predefined demographic traits, specifically youth and expert puppeteers.

Focus groups will be held in a meeting room on the Prince of Songkla University campus, and each session will be recorded for later analysis. The discussions will occur in Thai, as this practice minimizes cognitive load from translation and helps avoid translation errors (Colucci, 2008), despite most participants being proficient in English. The outline for the group process includes an introduction to the research objectives, background information, and guidelines for the focus groups, as illustrated in Figure 3.4.
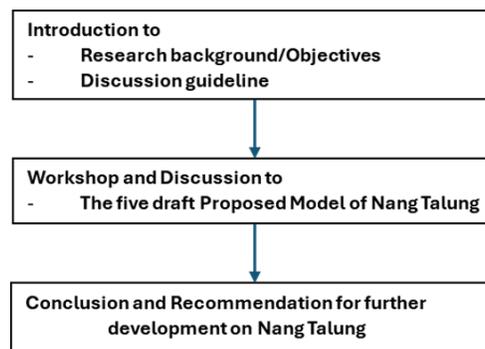
Figure 3.4 The Focus Group Process Guideline

The researcher will facilitate the focus groups, prompting questions when discussions begin to slow or need redirection. This light facilitation approach is intentional, as it encourages participants to share more information and interact freely (Barbour, 2018). An English translation of the focus group facilitation guide is summarized in Table 3.1. However, the guide does not encompass all prompts, as many evolved organically during the discussions and varied between groups.

Guideline for Focus group Discussion and In-Dept Interview
1. Are you aware that Nang Talung is becoming extinct?
2. Why do you think Nang Talung is fading away?
3. What do you believe attracted so many fans to Nang Talung in the past?
4. Do you think the presentations of Nang Talung today are less convenient than before? Why or why not?
5. How would you feel if Nang Talung were presented through modern communication technology, such as an animated AR game?
6. What aspects of Nang Talung are adaptable to animation?
7. What channels should be used to deliver Nang Talung? What would work best for youth? For the general population? Which channels would create maximum access?
8. What risks are associated with the digital animation of Nang Talung?
9. What are the pros and cons of using modern technology to present digital art forms like Nang Talung?
10. What do you think about using digital imagery to present Nang Talung? Do you believe it would improve convenience, access, or attract viewers? Why or why not?

Table 3.1 Guideline Questions for Focus Group Discussion and In-Depth Interview

3.4.3.2 In-Depth interviews

In-depth interviews with expert Nang Talung puppeteers from the older generation are conducted to explore their perspectives on the digitization of Nang Talung. Semi-structured interviews are chosen as they allow the interviewer to target specific information while gaining insights from the experts' experiences (Van Audenhove & Donders, 2019). To ensure participants feel comfortable and can express themselves fully, the interviews are conducted in Thai, as with the focus groups.

Each interview is approximately one hour in length and is recorded for subsequent transcription, translation, and analysis. The interview guide mirrors the focus group guide outlined in Table 3.1 to allow for comparative analysis between interview and focus group responses.

3.4.3.3 Design workshop

The third phase of data collection is the design workshop, which involves all youth participants and both expert puppeteers. This full-day workshop takes place on the Prince of Songkla University campus. During the workshop, participants engage in eight key activities, summarized in Table 3.2. Data collection methods include researcher observations and notes, along with artifacts generated throughout the design process, such as whiteboard captures, charts, and other visuals.

Key Activities List for Workshop
1. Introductions, explanations, and icebreaker activities
2. Viewing traditional Nang Talung performances, including a live performance by puppeteers and selected YouTube clips
3. Presentation of Digital Nang Talung design drafts
4. Brainstorming session to identify Nang Talung stories most adaptable to digital form
5. Selection of characters for animation
6. Presentation of character design principles
7. Participatory design and co-creation of Nang Talung characters by youth and Puppeteer participants
8. Summary and closing of the workshop

Table 3.2 Workshop Key Activities

3.4.4 Data analysis

The data analysis follows a thematic analysis approach, enabling the researcher to identify significant themes across a range of data sources, including text-based and non-text materials, even when they contain contradictory elements (Guest, Namey, & Mitchell, 2013). This approach is especially suitable for this study, as it accommodates the diverse types of data collected, such as transcripts from interviews and focus groups, observational notes, and design artifacts, each with unique structural formats (Braun & Clarke, 2022b).

Thematic analysis involves categorizing and interpreting data, ensuring that each theme aligns with both the internal data collected and external references to reveal emerging insights. The ultimate aim of this analysis is to generate a draft model, character designs, and selected traditional stories that will inform further exploration in participatory design and co-creation activities.

3.5 Study II: Interactive Design and Testing of Digital Nang Talung

Study II builds on the insights gained from the results of previous studies (Figure 3.5). In this phase, the finalized draft of the Digital Nang Talung model will be implemented and tested to address RQ3: **How can tools such as 2D animation, augmented reality (AR markers), game design, and interaction design be employed to create a novel form of Digital Nang Talung that enhances users' knowledge, attitudes, and practices (KAP)?**

This study aims to explore the effectiveness of digital tools and interactive design in making the art form more engaging and accessible, potentially fostering a deeper understanding and appreciation of Nang Talung among users.
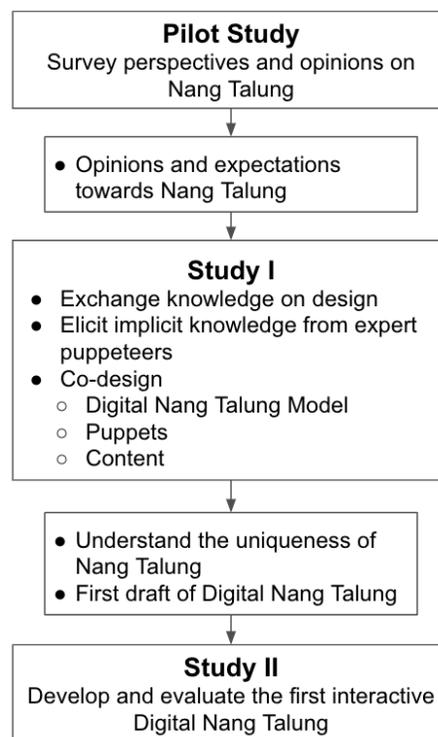
Figure 3.5 The input process for developing the first interactive Digital Nang Talung

3.5.1 Study aim and design

Study II follows a two-step action research process. The first step involves developing the Digital Nang Talung application, and the second step focuses on testing it. A Knowledge, Attitudes, and Practices (KAP) survey will evaluate users' knowledge, attitudes, and practices before and after engaging with the Digital Nang Talung application. This process utilizes a parallel mixed-methods design, where data collection and analysis are conducted simultaneously, and findings are triangulated to address the research question (Creswell & Plano Clark, 2018).

The research process begins with the design and development phase, which is followed by evaluation through questionnaires, in-depth interviews, and focus groups. The design phase includes the creation of a script, character designs, animations, motion graphics, and scenes to bring the Digital Nang Talung experience to life.

The design and development phase of Study II builds on concrete results from Study I. The researcher will develop the first interactive version of Digital Nang Talung to bridge the real and virtual worlds using suitable technology, scene design, character design, and a device that controls the puppet character's movement as a modern alternative to traditional sticks.

3.5.2 Population and sampling

This study employs purposive sampling, selecting participants based on their availability, interest, and willingness to engage. This method is particularly effective for focusing on specific groups that are integral to the research objectives, allowing a deeper exploration of perspectives and insights related to Nang Talung.

The sample includes two key groups. The first group consists of Thai students aged 18 to 22, enrolled in the Digital Media BSc program at Prince of Songkla University International College (Hat Yai Campus). The second group comprises traditional expert puppeteers who possess extensive knowledge and experience in Nang Talung, providing valuable input from a cultural and artistic standpoint.

3.5.3 Data collection

Data is collected from participants using multiple methods:
1. Self-Administered Knowledge, Attitudes, and Practice (KAP) Questionnaire: This questionnaire is conducted as both a pre-test and post-test to assess participants' knowledge, attitudes, and practices regarding Nang Talung.
2. Workshop Participation: During the workshop, data is collected through focus groups, interviews, and observations, capturing participants' responses and interactions for further analysis.

The self-administered KAP questionnaire, included in Appendix A.2, consists of questions in four sections:
- Part 1: General Information
- Part 2: Knowledge about Nang Talung
- Part 3: Attitudes toward Nang Talung
- Part 4: Practice in Nang Talung, with additional open-ended questions

To assess the internal consistency of the scales, the Kuder-Richardson-20 (KR-20) coefficient is applied, a widely used and reliable measure of scale consistency (Mohamad et al., 2015). The KR-20 produces a coefficient between 0.000 and 1.000, where 0.000 indicates no reliability, and 1.000 indicates perfect consistency in measuring the same construct (Brace & Bolton, 2022). Coefficients between 0.410 and 0.700 are considered moderately reliable, while values above 0.700 indicate high reliability (Brace & Bolton, 2022).

Data is collected using a pre- and post-test design, with measures repeated before and after the intervention (Alessandri, Zuffianò & Perinelli, 2017) to evaluate the effectiveness of the first version of Digital Nang Talung

In the workshop trial, participants from both groups play the first version of Digital Nang Talung. Following this, the focus group is loosely moderated to encourage open and natural discussion, allowing participants to share their thoughts freely (Barbour, 2018). The discussion guidelines are outlined in Table 3.3, and data is collected through observations and note-taking.

Topic Guideline for Focus Group
1. Opinions on the Digital Nang Talung game design
2. Use of the Digital Nang Talung game to increase youth interest
3. Potential distribution platforms for the Digital Nang Talung game
4. Access channels
5. Effectiveness of the Digital Nang Talung game in promoting traditional Nang Talung
6. Design-related concerns

Table 3.3 Focus Group Topic Guideline

The interview is conducted with traditional expert puppeteers after they play the first version of Digital Nang Talung with the youth. This unstructured interview aims to gather their insights about the application and suggestions for improvement.

3.5.4 Data analysis

Questionnaire
Data analysis is conducted using both descriptive and inferential statistics. Descriptive statistics include distribution tables, means, and standard deviations for the KAP items. Inferential statistics involve conducting paired t-tests to compare the means of all KAP items, determining whether there is a significant mean difference after users engage with the Digital Nang Talung application. The level of confidence for the test of significant differences was assessed at $P < 0.01$ for this analysis.

Workshop/Focus Group/Observations/Interview
Data analysis utilizes thematic analysis of the observation forms, integrated with the content from focus groups and interviews. Thematic analysis is particularly appropriate in this context because it does not depend solely on exact textual content (Braun & Clarke, 2022b). Given the combination of focus group and interview outputs, a more rigid content analysis approach would not be suitable (Krippendorff, 2018).

3.6 Study III: Bridging the Generation Gap with Digital Nang Talung

Study III is based on the results from the trial of the interactive Digital Nang Talung with participants from Study II. The process for improving Digital Nang Talung will be further developed according to the feedback and suggestions from both youth participants and expert puppeteers.

The aim of Study III is to answer RQ4: **How can Digital Nang Talung bridge the generational gap and address real-world needs as a form of folk media?**

3.6.1 Study aim and design

To address RQ4, the study aims to continue the digitization process of Nang Talung to bridge the generational gap in terms of Knowledge, Attitude, and Practice (KAP) between youth and older participants after their experience playing the fully digitized version of Nang Talung.

This stage begins with designing and developing a new version of Digital Nang Talung that incorporates feedback from previous stages of the study. Following this development, the research takes the form of an intervention study aimed at investigating its effects on participants' knowledge, attitudes, and engagement with learning, interest, enjoyment, perceived competence, perceived choice, and feelings of pressure and tension related to Nang Talung. This phase employs a quantitative-led mixed-methods design (Creswell & Creswell, 2023) because the primary focus is on validating the final version of the Digital Nang Talung application.

The final version of the Digital Nang Talung application is developed based on participants' suggestions for improving the previous version from Study II. This final version emphasizes the potential for full online accessibility and integrates principles of digital arts and tools to revitalize and sustain traditional Nang Talung in the modern world, which is the ultimate goal of this research study.

3.6.2 Population and sampling

The purposive sampling is selected due to the participants availability and interest to attend the study. There are two samples: the older group approximate age over 60 years old and the youth group is the university student age over 18 years old who are currently study in Animation and Visual Effects at the College of Arts Media and Technology, Chiang Mai University (CMU)
The site for study III located in the north of Thailand hosted by Chiang Mai University (CMU)

3.6.3 Data collection

Data is collected from participants through multiple methods:

1. Self-Administered Questionnaires ([Appendix E](#)) include:
    a. Knowledge, Attitudes, and Practices (KAP) Questionnaire: This assesses participants' knowledge, attitudes, and practices regarding Nang Talung and includes up-to-date public health advice from the Thai Ministry of Health, following standard KAP questionnaire practices (World Health Organization, 2008).
    b. Learning Engagement Questionnaire: Based on the four subscales of the Intrinsic Motivation Inventory (IMI), this questionnaire measures interest and enjoyment, perceived competence, perceived choice, and pressure and tension (Wilde et al., 2009).
    c. Usability Questionnaire: Constructed as a checklist of features to evaluate the usability of the Digital Nang Talung application.

    These questionnaires are administered both as pre-tests and post-tests to assess changes in participants' knowledge, attitudes, practices, and learning engagement regarding Nang Talung. Additionally, reliability is tested using the KR-20 coefficient.

2. Intervention Workshop Participation: During the workshop, data is collected through observations that capture participants' responses and interactions throughout the intervention. Observational data provides qualitative insights but may be limited by the researcher's perspective unless multiple observers are involved (Blaikie & Priest, 2017).

3.6.4 Data analysis

Pre- and Post-Test Self-Administered Questionnaires
Data analysis involves both descriptive and inferential statistics. Descriptive statistics include distribution tables, means, and standard deviations. Inferential statistics are used to conduct paired t-tests to compare the means of all KAP items, learning engagement, and usability, determining whether there is a significant mean difference after users engage with the fully online Digital Nang Talung application. The level of confidence for the test of significant differences was assessed at $P < 0.01$ for this analysis.

Observation During Intervention Workshop
Data analysis employs thematic analysis of the observation forms. Thematic analysis is particularly suitable in this context, as it does not rely solely on exact textual content and allows for capturing broader themes and insights from participants' interactions (Braun & Clarke, 2022b).

3.7 Conclusion

This research employs a mixed multi-stage method combining survey and action research across four distinct studies, each designed to address one of the research questions. A purposive random sampling technique is used to ensure that all collected data align with the study's objectives.

The research methodology not only involves a survey to understand perspectives and insights into traditional Nang Talung but also focuses on developing a new Digital Nang Talung model. This model integrates the traditional essence of Nang Talung with modern trends, responding to the rapid pace of technological advancement. The action research process includes an intervention to trial the new Digital Nang Talung model has assigned to the research as well.

Given that traditional Nang Talung is an intangible cultural heritage passed down through generations, this research incorporates the insights, perspectives, and opinions of expert puppeteers and participants from both the older (over 60) and younger (over 18) generations. This approach aims to revitalize Nang Talung in a way that fosters sustainability across all generations.

Pilot Study
A Preliminary Survey Research

Design	Survey and action research
Input	Participants: PSU students, young adults (age >= 18)
Process	Online questionnaire
Output	Analysis (descriptive, thematic/content); Answer research question #1

Study I
Participatory Design and Co-Creation for Digital Nang Talung

Design
- Survey Research

Input
- Five drafts of the proposed Nang Talung model
- Participants: PSU students, young adults (age >= 18)
- Site: Prince of Songkla University (PSU)

Process
- Action research; focus groups and in-depth interview with expert puppeteers

Output
- First draft of Digital Nang Talung application (combining traditional styles with new assembly techniques)
- Draft puppet character designs
- The selection of traditional stories for further study
- Answer research question #2

Study II
Interactive Design of Digital Nang Talung

Design
- Survey and action research

Input
- Development of the first interactive version of Digital Nang Talung application based on Study I
- Participants: PSU students and expert puppeteers
- Site: Prince of Songkla University (PSU)

Process
- Survey (KAP): self-administered questionnaire (pre-test and post-test)
- Workshop trial: participants from both groups play the first interactive version of Digital Nang Talung
- Interactive Workshop with participants, focus

Output
- The first interactive version of Digital Nang Talung application
- Participants' KAP evaluation
- Answer research question #3

Figure 3.6 illustrates a summary of the methodology, intervention process, and outcomes for each step of the research.

Chapter 4 : Results of Pilot Study

4.1 Introduction

The pilot study was conducted from April to July 2018 to answer the RQ1: **How do younger Thai people perceive Nang Talung as a performance art, and how can access to and interest in Nang Talung among youth be promoted?** This study aims to find:

1. The opinions and experiences of youth in Southern Thailand regarding traditional Nang Talung.
2. The interests and accessibility of youth to traditional Nang Talung.

These results will provide current data to align all studies in this research and address every objective of the research.

4.2 Results

The survey research was conducted using online questionnaires delivered to PSU students in the South. This sample represents the youth group aged over 18 years, drawn from a population of 400 students studying in the PSU International Digital Media Program during the 2018 academic year. A total of 135 students (33.75%) volunteered to participate in this stage. Additionally, semi-structured interviews were conducted with one expert puppeteer and five young students who completed the online questionnaires. These interviews were conducted using electronic devices, such as Zoom or telephone, based on the participants' preferences. The semi-structured format served as a guideline, allowing participants and the researcher to explore other areas of interest if relevant (Edwards and Holland, 2013).

Using descriptive statistics, the following tables and figures are presented to describe the survey results.

4.2.1 Participants demographics data

The demographic data of the 135 participants are shown in Table 4.1. The majority of participants were female (76.30%). Most were between the ages of 18 and 22 years old (97.78%) and were full-time students (97.78%).

Demographic Data	N	%
Gender		
Female	103	76.30%
Male	32	23.70%
Age (Years)		
18	3	2.22%
19	30	22.22%
20	30	22.22%
21	35	25.93%
22	37	27.41%
Current Status		
Full-time students	132	97.78%
Part-time students	3	2.22%

Table 4.1 Participants' Demographic Data

4.2.2 Media use in everyday life

Participants were asked questions about their media use in everyday life. These questions explored the technologies they use and their interests in various types of technology.

4.2.2.1 Media technologies

Regarding the devices and daily usage time of participants, Figure 4.1 and Table 4.2 shows that the most commonly used devices among participants are smartphones and the internet, with usage of 2-4 hours a day (53.33% and 54.07%, respectively). The second most used device is the laptop/desktop computer, with 1-2 hours of daily use (13.33%). Additionally, projectors and tablets are mostly not used in daily life (88.15% and 65.19%, respectively).
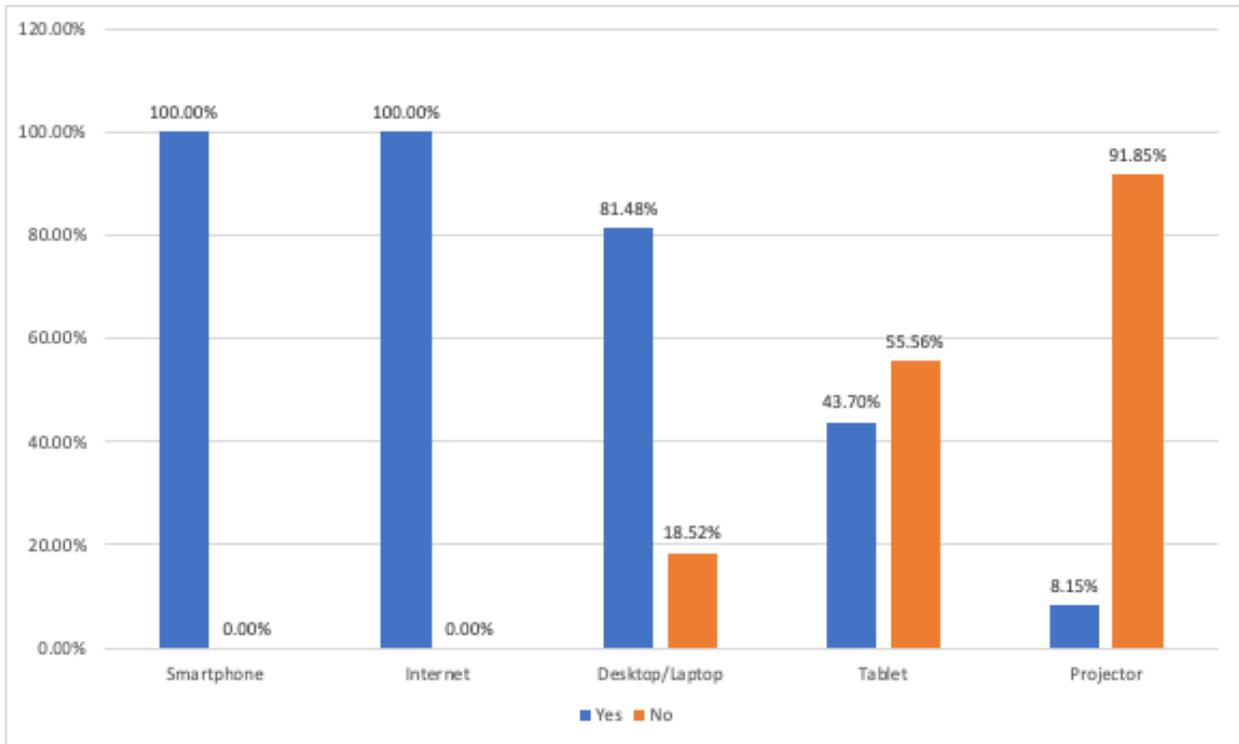
Figure 4.1 Technologies Used in Everyday Life

	Smartphone		Internet		Laptop/Computer		Tablet		Projector	
Usage (hours/ day)	N	%	N	%	N	%	N	%	N	%
Not use	0	0.00%	5	3.70%	88	65.19%	88	65.19%	119	88.15%
1-2	16	11.85%	15	11.11%	18	13.33%	28	20.74%	12	8.89%
2-4	72	53.33%	73	54.07%	15	11.11%	15	11.11%	4	2.96%
4-8	19	14.07%	17	12.59%	4	2.96%	4	2.96%	0	0.00%
>8	28	20.74%	25	18.52%	10	7.41%	0	0.00%	0	0.00%
Total	135	100%	135	100%	135	100%	135	100%	135	100%

Table 4.2 Technologies Used in Everyday Life

4.2.2.2 Media Interest

Entertainment media can be categorized into two main types: music and drama. This media is further divided into Thai and international content, with the latter including American, Korean, and Japanese media. Participants were allowed to select more than one option for media interest. Figure 4.2 shows that the majority of participants are interested in Thai entertainment media, including both music (n = 104) and drama (n = 70). American, Korean, and Japanese media follow in popularity, respectively.

This preference may be attributed to the fact that the participants are regional university students, most of whom are full-time and need to focus on their studies. Music entertainment is easier to access and requires less time to engage with compared to drama. Additionally, language barriers may have a varying impact on their media choices.
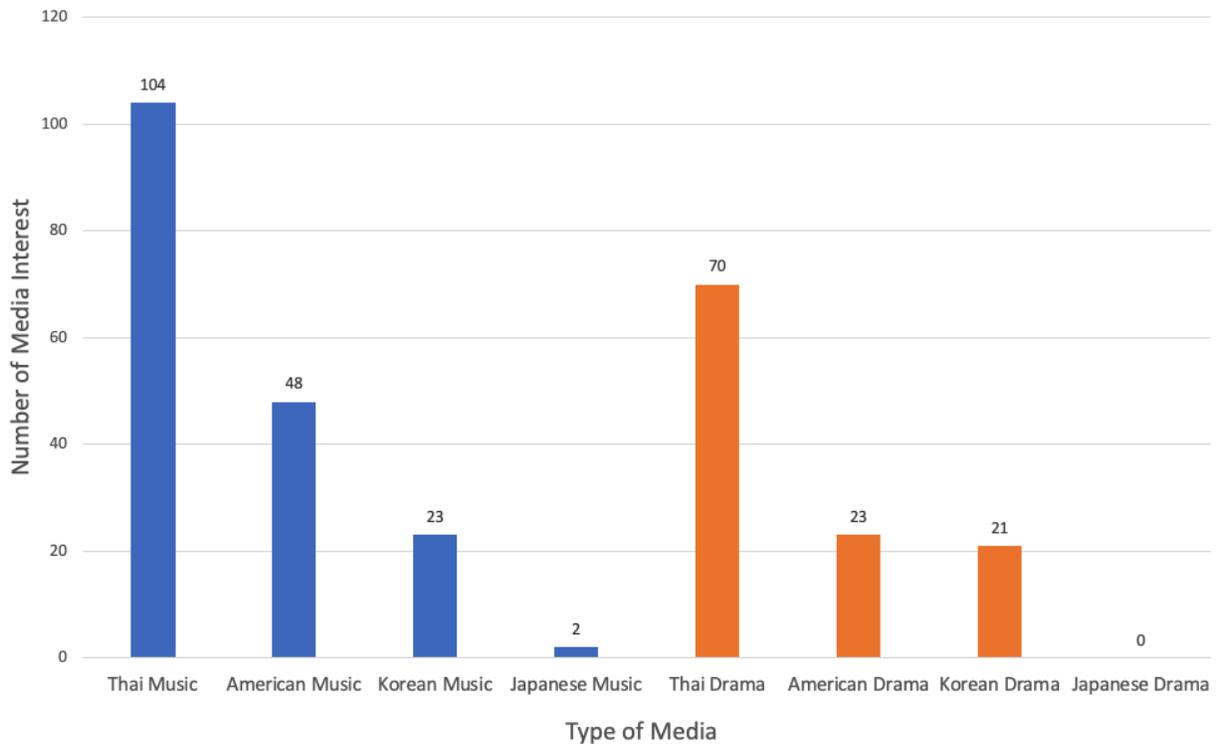
Figure 4.2 Type of Media Interests

4.2.3 Experience with shadow play

There are two main types of shadow play in southern Thailand: Nang Yai and Nang Talung. Nang Yai relies primarily on the large, hand-held puppets whose shadows are cast on a screen. In these performances, the puppeteer is often a man who moves and dances behind the puppet, bringing it to life. In contrast, Nang Talung features smaller, more detailed puppets and focuses on storytelling with intricate manipulation.

In this questionnaire, the term "shadow play" is used broadly to encompass both Nang Yai and Nang Talung. This approach was chosen to capture a wide range of perspectives and opinions on these traditional art forms.

4.2.3.1 The Engagement with shadow play

The majority of participants (80.74%) reported attending shadow play performances. Among the 109 participants who engaged with this art form, 49.63% attended fewer than five times per year. The most common venue for accessing shadow play performances was the internet (60.55%), followed by temple festivals (31.19%). Illustrated in Figure 4.3 and Figure 4.4
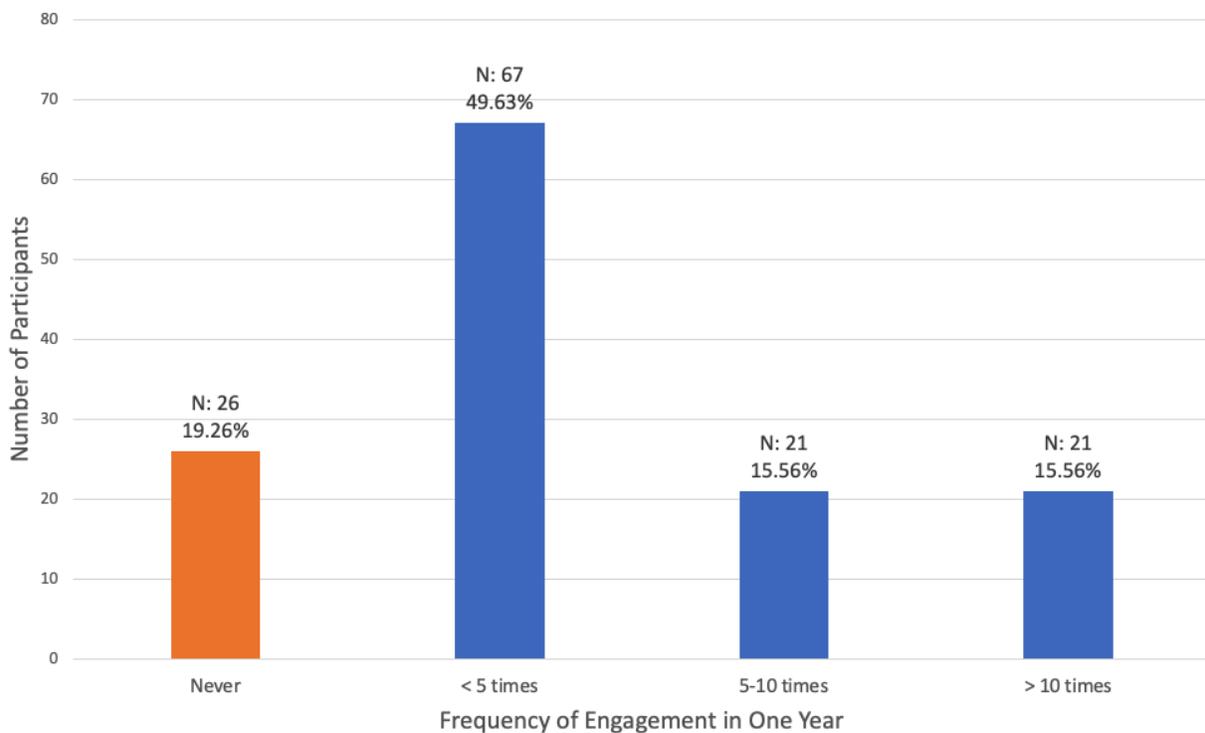
Figure 4.3 The Participants' Engagement Experience and Frequency of Watching Shadow Play
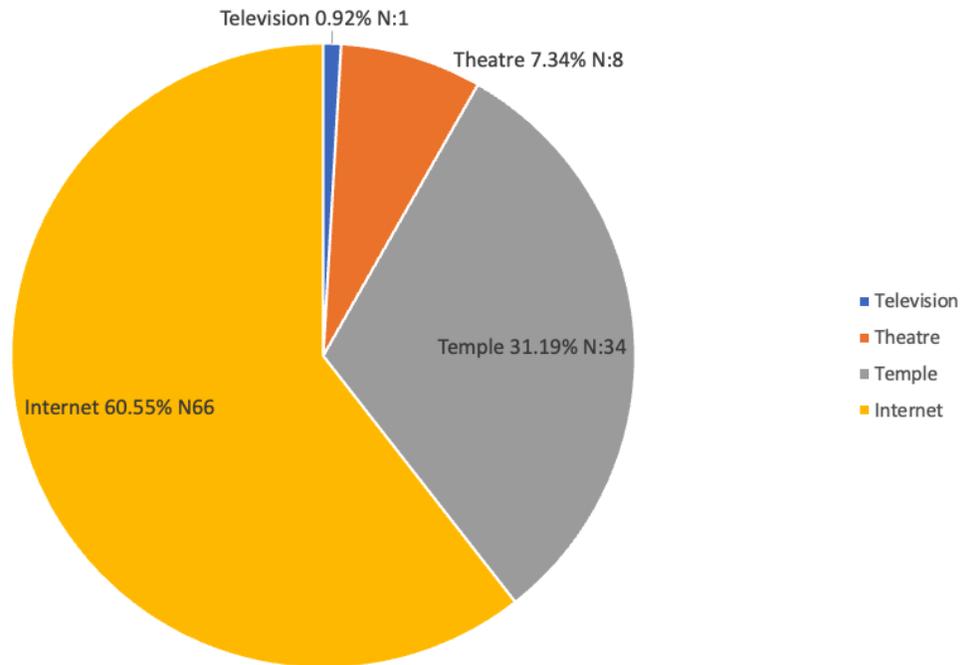
Figure 4.4 Venues for Engagement in Shadow Play

4.2.3.2 Opinions and Perspectives on Shadow Play as an Art Form

The study explored participants' opinions on shadow play as an art form, revealing significant insights into their preferences and motivations. When asked if they liked shadow play, approximately three-quarters of the sample (n = 98, 72.59%) responded positively, while the remaining quarter (n = 37, 27.41%) indicated that they did not. Notably, this figure includes participants who had never experienced shadow play; however, the majority of those who had seen it expressed enjoyment.

To further understand the motivations behind watching shadow play, participants were surveyed on their reasons for viewing it, regardless of whether they actually engaged with the medium. As illustrated in Figure 4.5, respondents were allowed to select multiple reasons for their interest in shadow play. The predominant reason identified was entertainment, with 108 selections reflecting that participants primarily consider shadow play a form of entertainment.

In contrast, fewer participants indicated other motivations, such as understanding social issues, with 37 selections, and gaining insight into folk media, with 36 selections. These findings highlight a pronounced trend, suggesting that shadow play is predominantly perceived as entertainment rather than a medium for exploring cultural or social themes. This preference for entertainment over other potential purposes emphasizes shadow play's role in contemporary cultural contexts, positioning it as a significant art form primarily enjoyed for its recreational value.
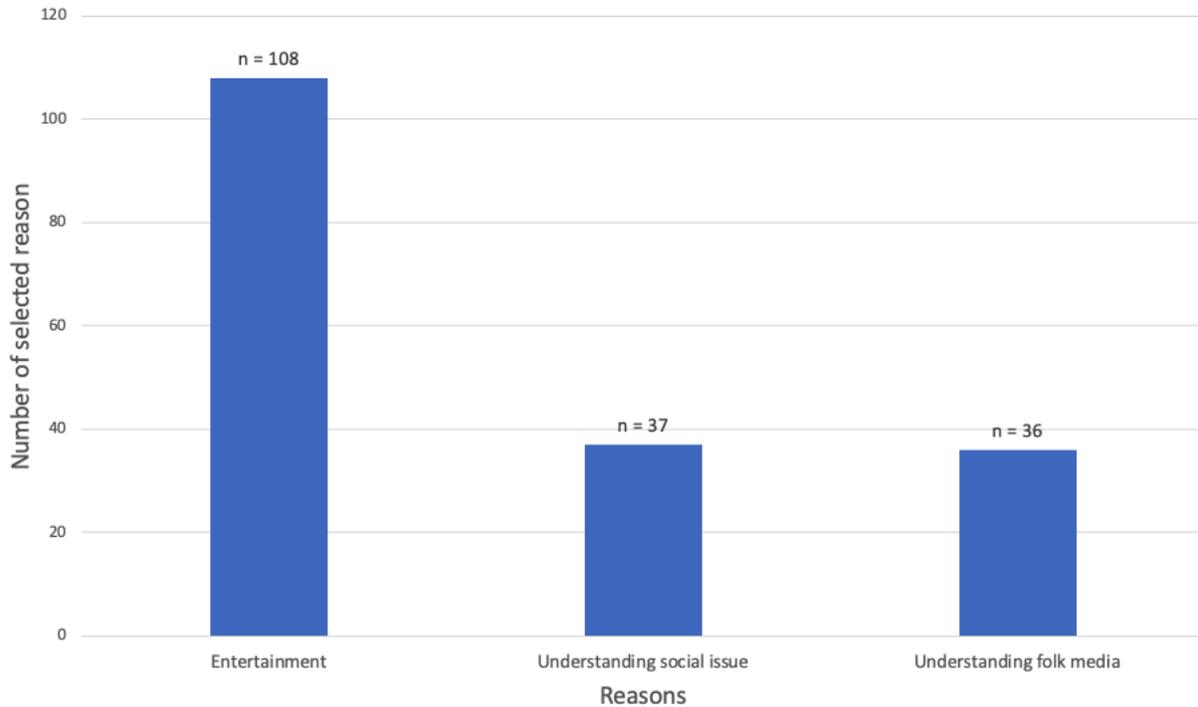
Figure 4.5 Reasons for viewing

As summarized in Figure 4.6, the most favored genre of shadow play among participants was comedy (n = 84, 62.22%), followed by history (n = 23, 17.04%) and fantasy (n = 18, 13.33%). Other genres, such as drama, animation, and romance, received significantly less interest.
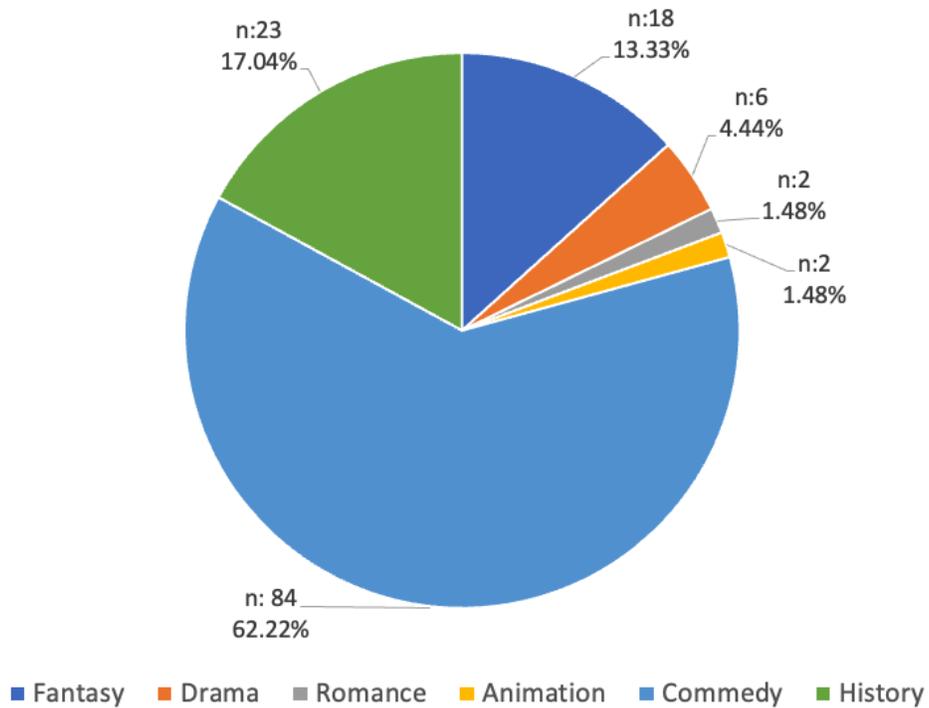
Figure 4.6 Favorite genres shadow play

4.2.3.3 Issues of Shadow Play and Digitization as a Presentation Tool

A key question addressed in the questionnaire was why young participants showed a lack of interest in shadow play and how they might be encouraged to become part of the audience.

The participants' perceptions that shadow play has less popularity compared to the past, of its less prevalent, less common (42.96% and 31.85% respectively). Besides, 25.19% of participants consider its more popular than last year. This indicates a general, albeit inconsistent, perception that shadow play is currently less popular than it once was, raising questions about what aspects of shadow play participants view as positive or negative.

To further investigate this, participants were asked to specify what they liked and disliked about shadow play performances. Responses are summarized in Table 4.3. Participants appreciated elements such as the jokes, storytelling, and script of shadow play performances. Conversely, they expressed concerns about the pacing of the performances, describing them as slow or too lengthy, as well as issues with surrounding noise and excessive dialogue. This highlights the perceptions of younger participants regarding shadow play as an art form.

Like Elements	N	%	Dislike Elements	N	%
Jokes	88	65.19%	Slow/too long	49	32.24%
Storytelling	19	14.07%	Noise	48	31.58%
Script	15	11.11%	Too much dialogue	35	23.03%
Music	6	4.44%	Rude jokes	18	11.84%
Poems	5	3.70%	Difficult language	2	1.32%
Live performance	2	1.48%			
Total Number of Like Elements	135	100%	Total Number of Dislike Elements	152	100%

Table 4.3 Participants' like and dislike elements on Shadow play

Participants were asked to identify the main charms of shadow play, with the option to select multiple responses (see Figure 4.7). Notably, the intergenerational transfer of stories and tales was the most frequently cited charm (n = 78), followed by the enjoyment of entertaining stories (n = 68), suggesting that participants place high value on the sharing of traditional narratives. Performance techniques were also noted (n = 53), while the nighttime setting was recognized by 22 participants. In contrast, only one participant considered the use of Southern language significant to the charm of a shadow play performance. These findings indicate that the transmission of engaging stories across generations is viewed as the most valuable aspect of shadow play, whereas the setting and language hold less importance.
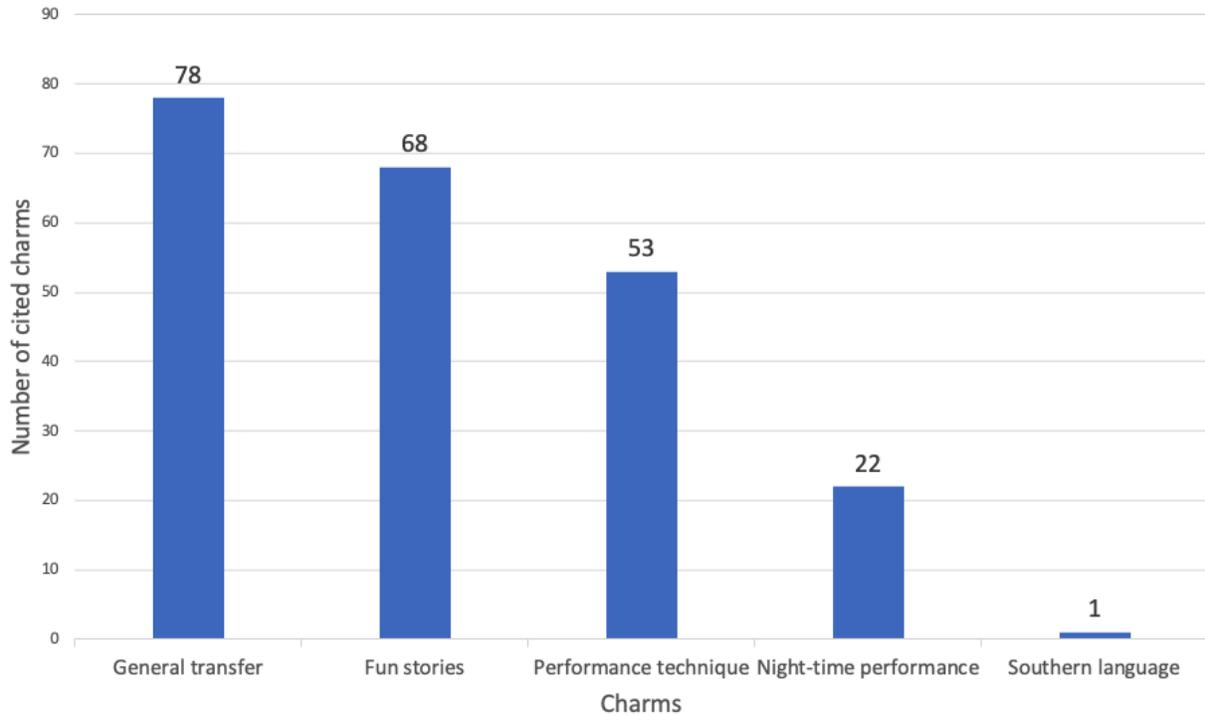
Figure 4.7 The charms of shadow play

For those participants who indicated they did not enjoy shadow play, an open-ended follow-up question was included. Although not all participants responded, those who did provided insights summarized in Table 4.4. The responses revealed four distinct categories for their lack of enjoyment. First, issues related to entertainment and comprehension were mentioned, with participants stating that the performances were boring and difficult to understand. Second, there was the modernity factor; participants felt that the shows were not contemporary enough and found modern narratives, such as movies, to be more appealing. Third, some expressed a preference for other forms of entertainment, such as music or different types of drama. Finally, regarding the opportunity to attend, participants indicated that they had no free time to attend performances or that shows were so rare they could not participate.

Enjoyment Issue and Reasons			
Entertainment Comprehension	Modernity	Preference	Opportunity to attend
● Boring ● Word and speeches difficult to understand ● Shows are not interesting	● Not contemporary enough ● Modern movies are more appealing ● Not interested in culture	● Music ● Drama	● No free time ● Shows are rare

Table 4.4 The reasons for lack and enjoyment in shadow play

These diverse rationales for non-attendance offer valuable insights into how shadow play could be adapted to attract audiences that currently do not engage with it. Potential improvements could include updating the narratives and language used in performances and making them more accessible to a broader audience.

4.2.3.4 The Possibilities of Digitizing Shadow Play

Regarding the participants' opinions on digitized Nang Talung, the majority of participants (n = 106, 78.51%) viewed digital presentations of shadow play as appropriate. However, 21.49% (n = 29) felt that the digitization of shadow play was not suitable.

The discussion on the pros and cons of digitizing shadow play revealed participants' perspectives on the advantages of digitization, including its potential to attract more attention, facilitate easier access for viewers, engage younger generations, and enable the transmission of cultural traditions and ethnic heritage. Conversely, some participants expressed concerns that digitization might compromise the traditional aspects of shadow play, diminishing its visual appeal and eroding the values and stories inherent in the art form. Therefore, it can be concluded that any efforts to digitize shadow play should honor its traditions, stories, and values, even if these narratives are updated to resonate with younger audiences. (Table 4.5)

Advantages	Disadvantage
Accessing younger generations and increasing their interest	Shadow play should remain traditional
Passing cultural treasures and ethnic heritage on to the next generation	Using technology could decrease the traditional charm of shadow play
Gaining more attention for shadow play	Increasing attention could decrease traditional values and stories
Making it easier to view shadow play	Digitization should not be allowed to take over
Technology can be used to improve production (e.g., lighting and sound)	
Blending in with everyday use of technology	

Table 4.5 The advantages and disadvantages of digitizing shadow play

Some participants suggested the possibility of digitizing shadow play, as summarized in Table 4.6. These suggestions can be categorized into three broad themes: technology, access, and education.

Technology suggestions include utilizing platforms such as YouTube and streaming services or using projectors at live performances to allow audiences to view shadow play at their convenience and to reach larger audiences. Access recommendations involve sharing shadow play on social media, creating rewatchable content, and encouraging young children to engage with the performances. In terms of education, it was suggested that the internet could be leveraged for publicity and to disseminate information about shadow plays, which could help increase audience engagement. Additionally, shadow play could serve as a medium to convey valuable cultural knowledge, broadening its relevance to contemporary audiences.

Technology Possibility	Access Possibility	Education Possibility
Use mobile phones to allow people to watch on YouTube	Share on social media	Use internet for publicity and to gain audience
Use live streaming or recording to allow people to watch from anywhere, at any time	Using technology makes shadow plays rewatchable	Distribute informational content about shadow play on Internet
Use projectors to increase how many people can watch	Encourage young children to watch	Use shadow play to communicate useful knowledge
Use at the right place and time		

Table 4.6 The possibility theme for digitizing shadow play

4.3 Interviewing Findings

Interviews were conducted with representatives from two groups. The first group consisted of the younger generation, with responses coded YG1 to YG5. These five interviewees were among the survey respondents who volunteered to participate in the interviews to provide further insights. The second group represented one expert puppeteer who has been performing for an extended period, coded as EP for this chapter.

The interviews were conducted using semi-structured interview guides, focusing on several key themes: interest in shadow play, the tension between tradition and change, accessibility of shadow play, and the digitization of shadow play.

4.3.1 Interest in Shadow Play

A significant issue identified during the interviews was the lack of interest in shadow puppet shows among younger generations. EP noted a decline in interest, stating:

> "Media from Western countries has more spice in it, so [younger] people tend to follow shows with more spice as well."
> "Kids don't get to go out at night much, so they don't get to see live shadow puppet shows."

Younger generation participants echoed this sentiment, expressing a relatively low level of interest in shadow puppet plays. Their statements included:

> "If I were alone, I wouldn't watch shadow puppet shows." (YG1)
> "It's not that I don't like shadow play, but I think I'm more drawn to art from Europe, like Greek or Roman art. There seems to be more to it." (YG3)
> "I have other stuff to do in life." (YG4)

These opinions suggest that while there is a general lack of interest in shadow puppet shows, participants may still engage with them as part of family activities.

4.3.2 Accessibility of Shadow Play

In addition to waning interest, issues of accessibility were highlighted regarding shadow puppet shows. EP noted a growing trend focused on celebrity showmakers, which not only increases costs for attendees but also detracts attention from emerging performers:

> "They only follow the showmakers they like. [These showmakers] sell more. They used to sell a show for 10,000 baht; now it's even more, 70,000 or 100,000 baht. There's no chance for newcomers."

Younger generation participants also recognized accessibility challenges related to shadow puppet plays. One participant remarked:

> "[Shadow puppet] shows are usually held in temples, which I don't get to visit very often." (YG2)

Participants further expressed concerns about the tradition being culturally inaccessible, particularly due to the use of specific regional languages and a general disconnection from modern culture. Some statements included:

> "They are not trying to blend in with modern culture. There is a chance they might disappear." (YG2)
> "It's mostly in the southern part of the country, so it's very specific." (YG4)
> "Every region in the south is different, so the language differs… sometimes I don't understand what they are saying." (YG3)

"I'm a southern person myself, and I don't understand." (YG4)

In summary, both physical and cultural inaccessibility of Nang Talung poses significant challenges to its potential for reaching a broader audience.

4.3.3 Tension Between Tradition and Change

A primary theme from EP's responses was the concern over maintaining the traditions associated with shadow play and how these traditions will be preserved for future generations. The expert puppeteer (EP) stated:

> "Traditional shadow puppet shows have their own ways, but now these ways have been cut out. Even the rituals have been eliminated."
> "Like the teacher's ritual, they don't follow the actual patterns… it's more like a music concert now, not a puppet show."
> "Modern shadow puppet shows are full of jokes and have less poetry than traditional shows. Sometimes there are too many jokes, and we miss the actual story."

Notably, younger participants did not share this concern. Instead, they felt that Nang Talung is out of step with modern culture rather than being overly influenced by it. This significant generational gap in perspectives should be taken into account when considering the digitization of Nang Talung.

4.3.4 Using Digital Technology

To consider how digital technology can be leveraged to promote Nang Talung, the expert puppeteer has previous experience collaborating with the university's cultural heritage department to record performances for YouTube. However, he expresses caution regarding digitization:

> "Nowadays, kids are morphing the traditions because they copy what they see on YouTube." (EP)

In contrast, younger participants expressed enthusiasm about using digital technology to enhance the accessibility of Nang Talung. Some of their remarks included:

> "Having them on YouTube would be cool." (YG2)
> "We spend our time on our phones…" (YG3)

This suggests a divergence in viewpoints regarding the application of digital technology in relation to Nang Talung. While EP acknowledges the potential benefits of digitization, younger participants recognize the importance of preserving tradition. This indicates an opportunity to find common ground in the digitization efforts for Nang Talung.

4.4 Discussion

The preliminary survey indicated that participants were generally aware of shadow play, with many attending performances at least occasionally. Most of those who engaged with shadow play expressed enjoyment, particularly appreciating elements such as humor, storytelling, and the transfer of folk tales from the older generation. This finding aligns with the role of Nang Talung as a heritage performance art that conveys traditional narratives (Lim, 2013).

For those who did not enjoy shadow play, several key issues emerged: the lack of contemporary storytelling, perceptions of the performances as boring or difficult to understand, and limited accessibility due to infrequent shows. These challenges could be addressed through various strategies, such as developing modern narratives, similar to recent initiatives at Khon Kaen University with the play Sinsai Roo Jai Ton (Akkapram, 2020). While the expert puppeteer (EP) expressed hesitance about modernizing storylines, they suggested that cautious adaptations could potentially enhance interest in the art form.

The potential for digitizing Nang Talung was supported by participants, despite some expressing concerns. Many already utilize digital platforms like YouTube and Facebook to access shadow play performances, suggesting that developing tools for digital engagement is viable. Previous modernization efforts, such as the incorporation of Wayang Kulit traditions in the mobile game Wayang Fighters (Ghani, 2015), exemplify successful adaptations.

However, respondents voiced caution regarding digitization and its potential negative effects on traditional performances and narratives. This sentiment was echoed by the EP, who noted the risks of altering stories and the possibility of losing older traditions due to digitization. Overall, there exists a tension between preserving the traditions of Nang Talung and the necessity of adapting these ICH traditions to enhance accessibility and sustain interest among younger audiences.

4.5 Chapter Summary

The purpose of the pilot study was to investigate attitudes and perceptions of Nang Talung among younger people and to explore the potential for digitization. The findings indicated that young individuals are generally aware of shadow play, and most, though not all, have attended shadow play performances. However, most do not attend very often, primarily due to the inaccessibility of the art form, which is constrained by time (nighttime performances) and space (temple festivals), as well as high costs. Instead, most younger participants reported watching Nang Talung performances online on platforms such as YouTube or Facebook.

The surveys supported the notion that digitization could expand access to and interest in shadow play. The interviews revealed a decline in interest in Nang Talung, likely influenced in part by the inaccessibility that has just been described but also by changes in traditions and contemporary culture. Additionally, a tension emerged between the desire to preserve tradition and the recognition of the need for change to enable this unique ICH traditions to remain alive.

Overall, digitization was viewed as an effective strategy for improving access to and knowledge of Nang Talung, and various ideas were proposed for how this process could be developed. The findings from this study serve as a foundation for the next study.

Chapter 5 : Results of Study I: Participatory Design and Co-Creation for Digital Nang Talung

5.1 Introduction

This chapter presents the design process for Digital Nang Talung, employing participatory design and co-creation to draft character designs, story elements, and an initial prototype. The study addressed RQ2: **How can participatory design and co-creation be used to create a model and implementation plan for Digital Nang Talung?**

Study I was informed by a review of relevant literature and findings from the Pilot Study survey. Using a multi-method approach grounded in action research, data were collected through focus groups, interviews, and a participatory design and co-creation workshop. The focus groups explored youth perspectives on Digital Nang Talung and its design, while in-depth interviews with expert puppeteers gathered their perspectives on the same topics. In the workshop, youth participants and expert puppeteers collaborated to discuss the digitization of Nang Talung.

The design development was guided by five initial model drafts proposed by the researcher, which were presented to all participants for feedback. This study took place at Prince of Songkla University (PSU) in September 2019.

5.2 The draft design for Digital Nang Talung

The researcher developed the draft design for Digital Nang Talung with two main components:

1. Five Proposed Draft Models for Digitized Nang Talung
2. Ten Draft Characters

The design concept was informed by a review of literature on traditional Nang Talung, an intangible cultural heritage (ICH) folk media, and by principles of Digital Arts as a form of digital communication. These elements were used to shape the five proposed draft models of Digital Nang Talung. Additionally, insights and suggestions from the preliminary survey were incorporated.

These designs were presented to all participants for their input, suggestions, and feedback during the participatory and co-creation workshop. This process aimed to gather valuable insights to answer RQ2.

5.2.1 Conceptual of drafting five models for Digitized Nang Talung

The concept of Digital Nang Talung as "intangible cultural heritage" (ICH) encompasses practices, representations, expressions, knowledge, and skills—as well as the instruments, objects, artifacts, and cultural spaces associated with these traditions—that communities and groups recognize as part of their cultural identity (Article 2 of the Convention for the Safeguarding of the Intangible Cultural Heritage, UNESCO, https://ich.unesco.org/en/convention). ICH is continually passed down and recreated, helping communities adapt to their environment and fostering a sense of identity and continuity across generations.

Pradana and Srisontisuk (2023) discuss how Wayang Kulit, the Indonesian shadow play, is at risk of fading due to societal changes, particularly the shift from agricultural to industrial societies. Originally performed during post-harvest seasons, Wayang Kulit played a vital role in small agricultural communities as entertainment and storytelling. The potential loss of such cultural practices is irreplaceable, as these performances are part of a living heritage (Lenzerini, 2011).

Nang Talung, similarly recognized as folk media, functions as a traditional form of communication that evolves over time (Kamei, 2015). Serving purposes from entertainment to education and intergenerational storytelling, folk media like Nang Talung preserves cultural knowledge while adapting to contemporary needs (Tamuli & Mishra, 2023).

Findings from the Pilot Study indicated that younger participants seldom attend Nang Talung performances, citing inaccessibility due to performance timing (usually at night), location (typically held at temple festivals), and high costs. The study suggested that digitization could expand access to Nang Talung and renew interest, particularly by overcoming accessibility issues and adapting to cultural changes. Digitization was thus identified as a strategy to make Nang Talung more accessible and relevant.

The concept of digital arts integrates a variety of media and communication tools to create and share art (Paul, 2023). As technology evolves, digital arts foster new creative possibilities, not only through digital tools but through creativity itself (Varnava, 2019). Modern digital arts encompass techniques like two-dimensional (2D) animation and a range of media that enhance engagement and reach broader audiences.

In this context, **participatory design** is a methodology that actively involves users in the creative process, contrasting traditional design, where users have limited input until the final product (Sanoff, 2007). **Participatory design** empowers users as **co-creators**, ensuring that digital tools and products align closely with their needs and preferences (Könings, Seidel & Van Merriënboer, 2014). By continuously incorporating feedback, participatory design fosters meaningful engagement and collaborative innovation (Wanick & Bitelo, 2020). This approach is especially valuable for bridging traditional cultural preservation with digital transformation, allowing communities to play an active role in safeguarding their heritage.

Using these key concepts (see Figure 5.1)—the tradition of Nang Talung, participatory design, and co-creation as a digital strategy—this study developed five initial model drafts to guide the digitization process of Nang Talung.
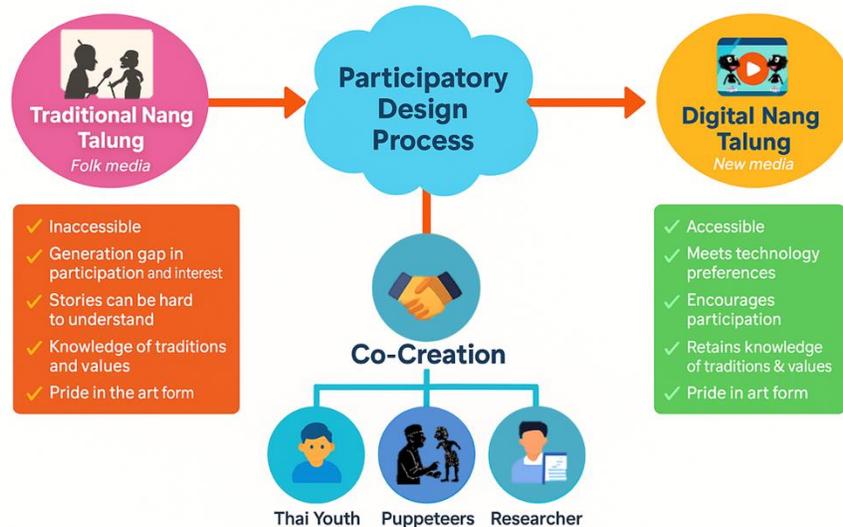
Figure 5.1 A conceptual framework for the development of Digital Nang Talung

5.2.2 The development of five draft models for Digitized Nang Talung

The proposed five draft models for digitized Nang Talung (see Figure 3.3) were developed based on the findings from the pilot study and focused around three core elements: technology, content, and actors.

- **Technology:** This element outlines how Digital Nang Talung would function, using tools like projectors, computers, mobile devices, and screens to display the performances.
- **Content:** This refers to the digital assets displayed in the performance, including story visuals, images, and animations.
- **Actors:** This element identifies the people involved in the production and viewing, such as puppeteers and users.

Drawing on these elements and the Pilot Study findings, the researcher developed five draft models for Digital Nang Talung. These models (Figure 3.3) range along a spectrum from traditional to fully digital, with Model 1 being closest to the traditional Nang Talung experience and Model 5 representing a fully digital performance.

Model 1: This model closely resembles a traditional Nang Talung performance, enhanced by digital technology to improve presentation and accessibility. A representation of a puppeteer is positioned behind a screen, where still images of the traditional performance are projected. Users in front of the screen can interact with the puppeteer using their computers or smartphones.

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Model 2: Similar to Model 1, this model utilizes moving images displayed through projection. Users can interact with the puppeteer and manipulate the moving images using augmented reality (AR) or other technologies via their computers or smartphones.

Model 3: Building on Models 1 and 2, this model features a puppeteer behind a screen. Animated images are sent to the screen through a computer or smartphone, allowing for dynamic interaction during the performance.

Model 4: In this model, content is presented through interactive animations, with the possibility of a digital puppeteer being present or absent during the performance. Users can engage with the content using their computers or smartphones, interacting with a digitized 'puppeteer' to manipulate the animations. Multiple users can participate simultaneously as long as they have their own devices.

Model 5: This model represents a fully digitized Nang Talung experience. Participants use their own computers or smartphones to engage directly with the content, allowing for a personalized interaction with the performance.

5.2.3 The development of ten draft characters

The ten draft characters (Table 5.1) were developed based on traditional Nang Talung characters. Certain characteristics or traits of these draft characters were intentionally designed to be ambiguous or contradictory. This approach aimed to encourage participants in the participatory design workshops to engage in discussions and reflections about the characters. By including elements that are not fully defined or that conflict with one another, participants were prompted to explore multiple interpretations and ideas, leading to richer dialogue and more innovative character development. This strategy fosters creativity and collaboration, allowing the characters to evolve based on feedback and contributions from the participants.

Notably, many of the characters incorporate traits associated with traditional clown figures, who often feature exaggerated physical characteristics—frequently with animalistic or sexual connotations. Their most distinctive feature is a protruding index finger, which symbolically represents a phallus and emphasizes their playful nature (Dowsey-Magog, 1994).

Representation	Characteristics
	Name: Teng Residence: Baan Kukhud, Amphur Tingpra (Pattalung Province) Physical appearance: Tall and lean, large mouth, black skin, white eyes, checked sarong Traits/personality: Enjoys fun and teasing, talks slowly and mumbles

	Name: Nu Nui Residence: Market in Amphur Muaeng (Songkhla Province) Physical appearance: Short and broad, large potbelly and buttocks, carries scissors, traditional sarong Traits/personality: Passive, compliant, naïve, dependent
	Name: Sri Kaew Residence: Member of Chengsae, Amphur Ranode (Songkhla Province) Physical appearance: Short and fat, bald, potbelly, big nose, dark skin, wears loincloth and bathing cloth Traits/personality: Wise, honest, straightforward, brave religious
	Name: Yodthong Residence: Khao Chumthong, Amphur Ronpibool (Nakorn Srithammarat Province) Physical appearance: Potbelly and protruding buttocks, upturned nose, dark skin, curly hair, wears loincloth, carries dagger Traits/personality: Pretentious, flirty, boasting, speaks loudly and interrupts
	Name: KwanMueang Residence: Buddhist temple (place not specified) Physical appearance: short and thin, swinging potbelly and protruding buttocks, dark skin, Roman nose, and big mouth Traits/personality: Arrogant, nervous, timid
	Name: Sa Mor Residence: Baan Sakom, Amphur Jana (Songkla Province) Physical appearance: Tall and thin, curved back, potbelly, high cheek bones, wears sarong and Indian hat Traits/personality: Thai-Islamic accent, conservative and rigid, hot-tempered, teases, tends to blame women for things
	Name: Poon ('Ai poon') Residence: Not specified Physical appearance: Fat, potbelly and protruding buttocks, large nose and mouth, protruding eyes, dark skin, wears sarong Traits/personality: Wicked, bullies, enjoys praise
	Name: Song Residence: Nakhorn Srithammarat Province Physical appearance: Tall and thin, long hair (tied back), wears Chinese clothes of trousers and long shirt, carries an axe Traits/personality: Chinese, likes to drink, positive personality
	Name: Mian ('Ai Mian') Residence: Not specified Physical appearance: Tall and thin, potbelly and protruding buttocks, large nose, and mouth, wears a tall, shaped hat Traits/personality: Likes to dance (Nora Kaew)

	Name: Kaew ('Ai Kaew') Residence: Amphur Thungyai (Nakorn Srithammarat Province) Physical appearance: Short and broad, potbelly, bald, flat nose and turned-down mouth, narrow ears, dark skin, wears a sarong and waistcloth Traits/personality: Exaggerates, likes to pick fights, thinks he is smarter than others

Table 5.1 The ten draft characters

5.3 Interactive method and result

In Study I, an action research approach was implemented, beginning with the researcher proposing five draft models of Digital Nang Talung. This was followed by a structured process involving discussions, interviews, and analysis aimed at developing an initial digital model of Nang Talung. The study was conducted through focus groups and workshops to foster collaboration and gather insights.

Participants were selected through purposive sampling based on their availability, interest, and willingness to engage in this design process.

Two participant groups were involved:

1. **Youth Group (YG):** This group consisted of 21 students from the 2018 academic year cohort in the Digital Media BSc Program at Prince of Songkla University (PSU).
2. **Expert Puppeteers (EP):** The second group comprised two expert Nang Talung puppeteers.

Data were collected through focus groups and workshops, and the results are as follows:

5.3.1 Focus groups

The first group, youth group (YG) consisting of 21 participants, was divided into three smaller groups with seven members each. The group process included an introduction to the research objectives, a background on the study, and guidelines for focus group discussions and interviews. Instructions were also provided for the workshop, focusing on co-creation and design.

The researcher facilitated the sessions, using a set of guiding questions and discussion prompts (Table 3.1). The focus group discussions were organized around three main themes: (1) knowledge and awareness of Nang Talung, (2) views on modernization and digitization of Nang Talung, and (3) preferences for digitization models for Nang Talung.

The youth focus group results were as follows:

The first theme, **Knowledge and Awareness of Nang Talung**
The participants shared a generally consistent understanding of Nang Talung as a traditional performance art associated with fairs, festivals, and funerals. Around half of the participants had attended a Nang Talung performance, typically at funerals or traditional events with family. Most agreed that Nang Talung performances were becoming rare and difficult to access, with minimal discussion of the art form among their peers. Overall, the focus groups expressed concern that Nang Talung was at risk of disappearing as a form of folk media.

The focus groups identified several factors contributing to the declining popularity of Nang Talung. The use of traditional Southern dialects often made performances challenging to understand. Additionally, the performances, typically held at night and in limited venues like festivals and funerals, were seen as inaccessible. This issue was compounded by a lack of advertising and limited awareness of upcoming performances.

One participant noted:
"Today, there are many options for visual entertainment: movies, YouTube, etc. Those are easier to access and more fun." (YG19)

Despite these challenges, participants recognized the value and appeal of Nang Talung, appreciating it as a comic and entertaining art form. Many acknowledged the puppeteers' skill in manipulating the puppets and delivering jokes and dialogue. Although few participants had extensive experience with Nang Talung, they viewed it positively and felt it retained a unique entertainment value.

The summary for this theme is: **Nang Talung, a traditional performance art linked to festivals and funerals, has become rare and faces barriers to popularity. Limited accessibility, including nighttime scheduling and dialect differences, restricts audience engagement. Despite these challenges, participants appreciate its comic and entertaining nature, as well as the skillful artistry of the puppeteers.**

The second theme, **Views on modernization and digitization of Nang Talung**
Participants generally did not perceive Nang Talung as more challenging to appreciate than in the past, assuming that puppeteers have already incorporated some modern techniques and stories. They expressed enthusiasm for using modern technology and media to increase Nang Talung's accessibility and appeal to new audiences. Participants suggested formats like cartoons, animated images, 3D visualizations, games, contests, and educational activities to attract interest and connect audiences with Nang Talung's narratives.

The focus groups highlighted the puppeteer's essential role in making Nang Talung enjoyable, appreciating their knowledge of traditional stories, storytelling skill, comic timing, and technical ability in puppet manipulation. Participants supported updating stories to be more entertaining and relevant, as long as modernization did not include offensive themes. They favored a balanced approach that retained traditional elements while adapting to modern tastes.

All groups agreed that smartphone-based digitization would make Nang Talung more accessible. Apps or platforms like YouTube would enable on-demand access, overcoming the limitations of traditional, time-bound performances. Digital platforms could also support the preservation of older stories, with a library of performances to retain and share traditional tales, expanding the reach of puppeteers to larger audiences.

Some reservations were raised, particularly around concerns that traditionalists might view digitization as a distortion. Participants worried that excessive adaptation might lead to the abandonment of original patterns and themes, altering Nang Talung permanently. They emphasized that digitization should respect and incorporate traditional elements, even as it adapts. They also noted that digitization alone would not guarantee youth interest, highlighting the need for efforts to educate younger generations on the cultural value of Nang Talung.

The summary for this theme is: **Participants were enthusiastic about using digital formats to broaden Nang Talung's reach while preserving key traditional elements, particularly the puppeteers' skills. They favored smartphone-based access to increase accessibility but emphasized the importance of educating younger audiences to maintain cultural interest and avoid altering core narratives.**

The third theme, **Preferences for digitization models for Nang Talung**
After a general discussion, focus groups evaluated the five draft models developed by the researcher (Figure 3.3), focusing on accessibility, interactivity, and appeal to youth. Table 5.2 summarizes the results.

Models 1 to 3, which closely resemble traditional Nang Talung with a stage and portable projector, were seen as less accessible and less likely to engage youth. Participants noted that these models lacked interactivity, as the puppeteer directed the performance with minimal audience engagement.

In contrast, Models 4 and 5, using smartphones or computers, were viewed as more accessible and appealing to younger audiences. These models encouraged interaction, as users could actively participate rather than being passive viewers. However, each model had limitations: Model 4, using a projector, still restricted access by being time- and location-bound, while Model 5 allowed only single-user access, which could be a barrier for youth without personal devices.

In response, participants suggested creating a new Model, which would combine the multi-user accessibility of Model 4 with the digital flexibility of Model 5, maximizing interactivity and accessibility.

Model	Summary Opinion	Reflections
Model 1: Projector +Still image + Computer/smartphone + puppeteer	● Not easily accessible for youth ● Need for projector and other equipment ● One-way communication: a puppeteer must present	"... The puppeteer may understand the format but still needs to procure equipment…"
Model 2: Projector +Moving image + Computer/smartphone + puppeteer		"...Does not solve the youth-access challenge..." "...Non-interactive...one-way communication..."
Model 3: Projector +Animation + Computer/smartphone + puppeteer		"...Increases the eye-catching component…but still not enough to attract youth..."
Model 4: Projector + Interactive Animation + Computer/smartphone+ (puppeteer)	● Youth can access and perform the Nang Talung themselves ● Interactive experience; but only solo ● Requires a projector ● Multiplayer experience requires equipment sets for each user	"...Children could play this on their own, but they would need a projector..." "...Each user would have to have their own set of equipment; that might be logistically difficult..." "...It would be best if children could participate in the action…"
Model 5: Interactive Animation + Computer/smartphone	● Easiest for youth access ● Can play the Nang Talung on one's own; interact with the software ● This is appropriate for single user experience; for multi-user experience, there would have to be linked software through personal hardware ● This could be designed to make Nang Talung more interesting for youth	"...This is most accessible since youth already have the necessary equipment..." "...This could lead to designs which are fun and promote learning. There could be competitions via smartphone apps; though it would be a single-user experience…" "...For multi-user, there could be a linkage to a single projector while individuals joined the action in a shared space…" ".. The Nang Talung content could be educational..."
Proposed New Model	● Combine features of	"...The challenge is to use a

	Models 4 and 5 to allow for group and individual players with a single projector and users interacting via smart phones on personal screens	single projector which is shared by multiple users via a smartphone application"

Table 5.2 Summary of opinions on draft models for Digital Nang Talung

The interviews with expert puppeteers (EP) focused on the same themes as the youth group (YG). Here are the results:

The first theme, **Knowledge and Awareness of Nang Talung**,
The expert puppeteers echoed the concerns of the youth focus groups, agreeing that Nang Talung is at risk of disappearing, particularly due to a lack of interest among potential new performers. One interviewee emphasized:

"It's true that it could go extinct if there is no one to carry on the art." (EP2)

Several reasons were cited for this decline. Firstly, the puppeteer's role is challenging and requires a high level of dedication, which is less appealing to younger generations. This decline in interest has resulted in fewer skilled puppeteers and, consequently, rarer performances. As one expert noted:

"...Those who really know the epic tales depicted in Nang Talung are becoming rarer. It takes real dedication to learn to be a skillful puppeteer. That's the only way to keep its attraction…" (EP1)

Additionally, there is a perceived lack of interest and understanding among younger audiences, partly due to the use of Southern dialects that many do not understand, which diminishes their enjoyment of the performances. Another concern raised was the lack of education and promotion of Nang Talung. One expert emphasized the need for more public relations and marketing efforts:

"…There needs to be more P.R. and marketing; just like they do with modern media. That way, it can be preserved. However, there is too little promotion. There needs to be a stronger effort…" (EP2)

Despite these challenges, the expert puppeteers acknowledged existing preservation efforts, such as the rise of conservation clubs that both practice and modernize Nang Talung. According to EP1, these clubs play a crucial role in keeping the art form alive, making its complete extinction less likely. The experts also highlighted that Nang Talung's traditional storytelling and humor still have strong appeal, even if modern audiences are not as familiar with the original literature.

Interestingly, the interviewees noted that performing Nang Talung has become easier in the modern era due to technological advancements:

"...It's not that complicated…it's even easier than before. There is electricity, amplifiers… the quality is better…" (EP1)

"…It's easier to research new information, especially from the computer. These days, Nang Talung is even being featured on social media…" (EP2)

The summary for this theme is: **Expert puppeteers are concerned about the decline of Nang Talung due to a lack of interest from younger performers and audiences. Challenges include the difficulty of puppeteering, language barriers with the Southern dialect, and limited promotion. However, they acknowledge ongoing preservation efforts by conservation clubs and believe modernization, such as using social media and technology, can enhance accessibility. Despite concerns, experts see potential for Nang Talung to thrive in the modern era with improved marketing and adaptation.**

The second theme, **Views on modernization and digitization of Nang Talung**
The interviewees were cautiously optimistic about the modernization and digitization of Nang Talung. They believed that digitization could expand its reach and make it more accessible to younger audiences. However, they stressed that modernization must be handled carefully to avoid degrading or distorting the traditional stories and art forms. To preserve the authenticity of Nang Talung, they recommended involving experts, such as puppeteers, in the digitization process.

Creating new content was not seen as incompatible with tradition. As EP1 highlighted, while many plays are based on traditional sagas and histories like the Ramakian and Phra Wet Sandorn, others, such as "The Youth With The Red Hat" (a popular comic play), were creatively developed by puppeteers. Thus, updating material was acceptable, provided it maintained the traditional format and was age-appropriate.

"...The content could be adapted from popular plays and dramas. Movie stars could be represented by puppets. However, it's essential to communicate properly…" (EP2)

Similar to the youth focus groups, the interviewees agreed that digital platforms like YouTube and television channels, especially when paired with animation, were effective for engaging younger audiences. These channels are widely accessible and commonly used, making them suitable for promoting Nang Talung. However, they emphasized that the digitization process should carefully preserve the original artistic elements to prevent losing the uniqueness of Nang Talung.

"...Care must be taken to ensure that the content is accurate and not distorted..." (EP1)

The interviewees also advocated for a collaborative design and development process to ensure that the digital version of Nang Talung remains true to its traditions.

"...The design should be a collaborative learning process…this would ensure accurate content and wider acceptability…" (EP2)

Overall, digitization was viewed positively, as it could help Nang Talung reach new audiences and adapt to modern preferences. However, there was a concern that:

"…cultural aspects might be lost or distorted if the content is inaccurate or deviates too much from the traditional form…this needs to be protected to prevent extinction…" (EP2)

The summary for this theme is: **Interviewees were cautiously optimistic about digitizing Nang Talung, seeing it as a way to reach wider, younger audiences. They emphasized that modernization should be done carefully to preserve traditional stories and artistic integrity, involving expert puppeteers in the process. While new content aligned with tradition was welcomed, maintaining authenticity was crucial. Digital platforms (e.g., YouTube) were seen as effective, but there were concerns that over-modernization could distort cultural aspects. Therefore, a balance between innovation and tradition was essential to protect Nang Talung's heritage.**

The third theme, **Preferences for digitization models for Nang Talung**
The expert puppeteers (EP) were cautiously optimistic about using projectors in performances but noted that it could be costly and would require experimentation to determine its effectiveness. More importantly, they did not see projectors as a viable solution for expanding accessibility or attracting youth audiences, who are already disengaged from traditional performances. Instead, they recommended developing animation-based content that highlights key aspects of Nang Talung.

They proposed dividing this content into two parts: (1) exploring the history and performance techniques of Nang Talung, and (2) emphasizing its role in transmitting cultural values (Table 5.3). A specific example suggested by both EP1 and EP2 was the fantasy story Nam Jai Mae, which focuses on family ties and moral lessons (Appendix B: Part 2).

Topics	Key Points
Part 1: History and Performance of Nang Talung	
1) History and Background of Nang Talung	- Widespread throughout Southeast Asia - May have originated from India or developed independently - Various forms exist based on puppet size and movement - Nang Talung and similar types use small, interconnected puppets

2) Origin of Nang Talung in Thailand	• The origin is unclear • Has a strong history in Phatthalung, Nakhon Si Thammarat, and Surat Thani
3) Nang Talung, Past and Present	• An indigenous Southern Thai art form • Uses the Southern Thai dialect • Commonly features poetry for dialogue • Sources include epics, histories, fables, and other texts • Historic changes in tools (e.g., shift from oil lamps to electric lights) and purpose (entertainment, moral instruction)
4) Nang Talung Forms	• Puppets and stock characters • How are the puppets constructed? • What are the stock characters?
5) Nang Talung Performance	• Performers and roles, troupe structure • Equipment (lights, screens, amplifiers, etc.) • Settings and stages (temples, fairs, etc.)
6) Role of Nang Talung in Society	• Entertainment • Communication • Traditional lore • Conservation and sharing of indigenous arts
Part 2: The Role of Nang Talung in Transmission of Cultural Values	
Presenting Stories that Promote Traditional Values	• Apply the concept of traditional story "Nam Jai Mae"

Table 5.3 The expert puppeteers' summary proposed topics for the content of Digital Nang Talung.

5.3.2 Workshop: Participatory and Co-Creation for Digital Nang Talung

A participatory co-creation workshop was held at Prince of Songkla University International College (Hatyai Campus) with the aim of promoting a sense of ownership and engagement in the digitization of Nang Talung.

Participatory design workshops bring together various stakeholders to foster communication and collaboration (Bødker et al., 2022). This particular workshop incorporated collaborative prototyping, allowing participants to explore design alternatives. Such methods are commonly used in projects focused on preserving and increasing access to intangible cultural heritage through digital arts (Slingerland et al., 2022; Giaccardi et al., 2006; Harwood & Garry, 2014; Bødker et al., 2022; Ariya, Puritat & Intawong, 2019; Permatasari & Cantoni, 2021; Nofal, Van Saaze & Wyatt, 2022; Salvesen & Keitsch, 2021).

Two expert puppeteers participated in the workshop alongside younger participants, ensuring contributions from both experienced artists and youth (EP and YG groups). This inclusive approach aimed to reflect the needs and perspectives of both generations.

The session began with an orientation and a summary of findings from earlier focus groups, interviews, and design concepts. Key concepts included:
- Basic information about Nang Talung and classic puppet examples
- Basic principles of animation and animation design
- Character design
- Costume design

Participants were introduced to a set of ten draft characters (Table 5.1) to inspire the creation of new characters for the digitized version of Nang Talung. Twenty-one younger participants collaborated using their creativity and knowledge of Nang Talung, while the puppeteers shared their expertise with the group.

The workshop integrated results from youth focus groups (YG, n=21) and in-depth interviews with expert puppeteers (EP, n=2), focusing on three main themes: knowledge and awareness, views on modernization and digitization, and preferences for a digital Nang Talung model (Model 5). Participatory design, as a user-centered approach, is widely applied in technology and communication design (Spinuzzi, 2004). It treats users as active collaborators, shifting the researcher's role to that of a facilitator and fostering collective creativity (Sanders & Stappers, 2008). Design anthropology also explores how participatory design helps shape social, cultural, and technological futures (Smith & Kjærsgaard, 2015) and supports children's learning in community settings (Belgrave et al., 2022).

Participants were given art supplies to create their character designs, with one guideline: the designs should remain visually consistent with Nang Talung traditions. This balance allowed creative freedom while honoring cultural heritage.

Figure 5.2 presents a selection of participant-created designs. These ranged in complexity, with some including names, backstories, and personalities, while others focused on visual appearance. Two designs even featured character dialogues and scenes.
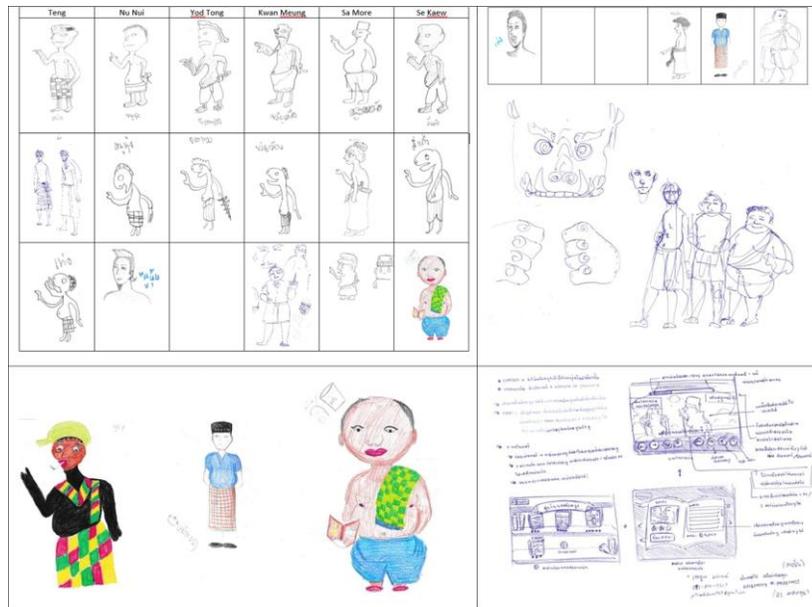
Figure 5.2 Some of the visual designs from the workshop

Synthesis of Character Design Elements from the Participatory Process

The study analyzed 126 character sketches produced by 21 students (each designing six characters) to identify recurring elements that reflect southern folk shadow puppetry traditions (Appendix D1). This process followed the Participatory Design method alongside the Design Anthropology approach, which emphasizes cultural understanding through participatory methods (Gunn, Otto, & Smith, 2013; Sanders & Stappers, 2008).

Key Findings as illustrated in Table 5.4:
1. **Body Structure:** 14 out of 21 students (66.67%) used a "Super Deformed" (SD) style, with large heads and small bodies, creating a friendly and approachable appearance.
2. **Eyes:** 18 students (85.71%) used large eyes with small pupils, often paired with expressive eyebrows to clearly convey emotion.
3. **Mouth:** Most characters had open mouths with defined lip lines, and some included teeth to further express personality.
4. **Hair and Hairstyles:** All sketches included distinct hairstyles reflecting each character's identity, such as:
   ○ "Teng" with curly hair
   ○ "Samo," a Muslim character, wearing various head coverings
   ○ "Si Kaew" is designed to be bald, following the original characteristics of shadow puppetry.
5. **Costume and Weapons:** All designs maintained traditional clothing and accessories, especially for clowns, villains, and heroes, highlighting the participants' awareness of cultural context.
6. **Nose:** 17 students (80.95%) drew large noses, a classic Nang Talung feature used to reflect character personality.

7. **Pose and Orientation:** Over 90% of sketches showed characters aligning with traditional Nang Talung performance styles.

Key Findings	The Nang Talung character designed by the younger group (YG)			
1. Body Structure	YG 11	YG 1	YG 6	YG 2
2. Eyes	YG 1	YG 5	YG 6	YG 8
3. Mouth	YG 9	YG 4	YG 8	YG 7
4. Hair and Hairstyles	YG 6	YG 15	YG 17	YG 9
5. Costume and Weapons	YG 8	YG 21	YG 9	YG 7

6. Nose				
	YG 9	YG 6	YG 2	YG 1
7. Pose and Orientation				
	YG 11	YG 4	YG 16	YG 7

Table 5.4 Some examples of key findings of character design elements

Summary of Common Design Elements

1. Body structure with a head larger than the body (Super Deformed): 66.67%
2. Large eyes, small pupils and eyebrows: 85.71%
3. Large nose: 80.95%
4. Open mouth, clear lip edges, some models have teeth
5. Simple arms and legs, emphasizing the index finger gesture
6. Preservation of costume and weapon identity: 100%
7. No one raised questions about one of the most distinctive features of clowns—the protruding index finger, which is often interpreted as a phallic symbol. In the past, this element symbolized fertility, humor, and irreverence, reinforcing clowns' roles as both comedic and spiritual figures. While such exaggerated features may have entertained audiences historically, they may no longer carry the same meanings today.

Design Choices and Design Anthropology in Character Design

The design decisions in this study were guided by participatory design principles, supported by literature on **design choices** (Rouwette & Franco, 2024) and **design anthropology**. Rouwette and Franco (2024) emphasize that the success of team-based interventions depends on deliberate and well-informed design choices, particularly those that actively involve relevant stakeholders and experts. In this study, expert Nang Talung puppeteers and student participants were intentionally included in the co-creation process to ensure access to cultural knowledge, technical expertise, and fresh creative perspectives. This aligns with Rouwette and Franco's recommendation to include key stakeholders who are both knowledgeable and invested in the cultural outcome, thereby enhancing the likelihood of producing a solution that is authentic, engaging, and implementable.

However, one of the most distinctive features of traditional Nang Talung puppet design—the protruding index finger, often shaped like a phallus (Dowsey-Magog, 1994)—was deliberately excluded or modified in the participants' designs. Traditionally, this feature symbolizes fertility, humor, and irreverence, reinforcing the puppets' role as both comedic and spiritual figures. The exaggerated physical elements not only entertain but also convey deeper cultural and philosophical meanings. The participants' avoidance of this feature may reflect shifts in modern social norms. Contemporary younger generations, having learned about sexuality through formal school curricula and growing up in an environment where discussions about sex are more open, may no longer view such explicit symbolic gestures as humorous or culturally relevant. As a result, the red protruding index finger may no longer serve as an effective or meaningful element for entertainment in today's context.

From the perspective of the double-edged nature of Disneyfication, the participatory design process can be interpreted as a deliberate response to the risks associated with cultural simplification and commercialization. As discussed in the literature, Disneyfication is commonly understood as the aesthetic simplification, standardization, and market-oriented transformation of culture (Bryman, 2004). Within heritage contexts, such processes may reduce symbolic depth and detach traditions from their community foundations.

In this regard, the participatory workshops functioned as a safeguard against uncritical gamification or excessive simplification. From a design anthropology perspective, integrating local cultural knowledge into the artefact's development helped mitigate the risk of homogenization. Students incorporated elements of local identity such as Muslim attire and traditional clown figures while expert puppeteers provided guidance to preserve the narrative structure, symbolism, and performance logic of Nang Talung. This aligns with concerns in the literature that culturally meaningful design is necessary to prevent over-commercialization or "Disneyfication" of heritage (Kieven, 2012).

At the same time, the literature on living heritage emphasizes that adaptive transformation is essential for continuity (Ludwig & Wang, 2020). The integration of digital aesthetics and interactive elements can be understood as a form of strategic adaptation rather than mere commodification. In this sense, processes resembling gamification and simplification were embedded within a structured and culturally grounded methodology.

By incorporating expert involvement, stakeholder inclusion, and iterative feedback (Rouwette & Franco, 2024), the development process reflects an awareness of the double-edged character of Disneyfication. The design choices were therefore not arbitrary aesthetic modifications, but negotiated adaptations that sought to balance accessibility and user engagement with cultural integrity. This approach situates the Digital Nang Talung artefact within the broader tension identified in Disneyfication literature: the need to modernize and engage contemporary audiences while safeguarding symbolic richness and community-based authenticity.

Workshop Outcomes:

1. **Engagement and Positive Attitudes:** Participants felt connected to the process. One commented, "I want to be part of the design team… it should be fun… and it makes me appreciate Nang Talung more…" (YG21).
2. **Character Designs:** Participants developed raw designs reflecting traditional Nang Talung aesthetics and personalities ([Appendix D1](#)).
3. **Support for Digital Animation:** Both youth and expert puppeteers endorsed the use of 2D digital animation as a means of digitization.

The workshop's co-creation process aimed to ensure that the final Digital Nang Talung model (Figure 5.3) would reflect the participants' collective input and lead to a sense of ownership and satisfaction in the new digitized form of Nang Talung.
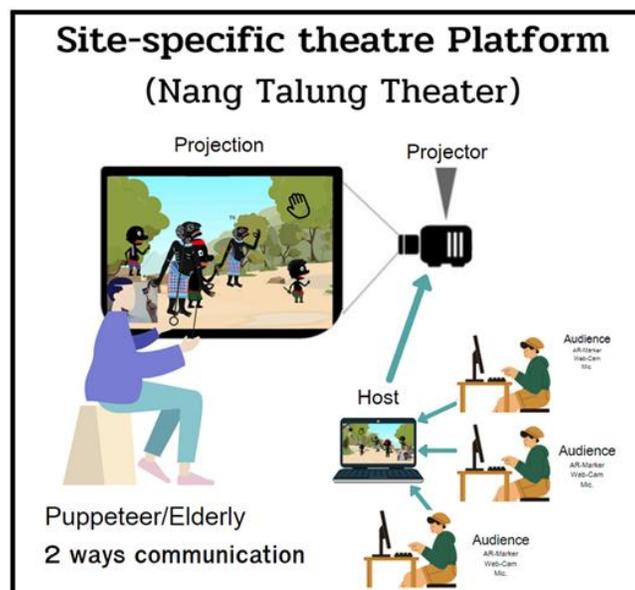
Figure 5.3 The draft design model for Digital Nang Talung

5.4 Discussion

This study addresses RQ2: **How can participatory design and co-creation be used to create a model and implementation plan for Digital Nang Talung?** To answer this, action research with a multi-method approach was employed. The process began with the development of five selected draft models for Nang Talung and ten draft puppet character designs. These drafts served as raw materials to stimulate participants' ideas and feedback during the co-creation workshop. Additionally, focus groups and interviews were conducted to align with the workshop's goals.

The workshop, as a form of social interaction, played a crucial role in bridging generational gaps in cultural heritage (Siebler, 2016). It also made the experience more engaging for younger audiences, who may find interactivity more enjoyable (Kawabata & Mallett, 2022).

Through this process, an initial draft model for Digital Nang Talung emerged. This model envisions the puppeteer as central to the practice of Nang Talung. However, rather than being confined to traditional venues like temples and festivals, the puppeteer's performance is projected and captured for transmission to a wider audience, who can view it on their own devices. Additionally, low-cost sensor devices and real-time, two-way interactions allow the audience to engage with the puppeteer. The characters, designed using 2D animation, incorporate modern stories as well. The envisioned benefits of this digitized model for Nang Talung include:

- Increased access to Nang Talung performances
- Two-way interactivity and communication between audiences and the puppeteer
- Bridging virtual and real-world performances of Nang Talung
- User-friendly design that encourages interaction for both the audience and puppeteer

The draft puppet character designs were created by individuals and groups, with guidance from expert puppeteers. Each design was carefully reviewed, integrating the expertise of the puppeteers with the ideas of the youth participants. The process allowed for open interaction, with respect for the elders and a sense of enjoyment, in line with Thai cultural values. The result was an optimistic outcome for the study, highlighting the potential for Digital Nang Talung.

5.5 Chapter Summary

Five draft models for Nang Talung, along with ten draft puppet characters, were presented to all participants. These initial drafts served to stimulate their ideas for co-creation during the workshop. Additionally, focus groups and interviews were conducted as baseline activities before the co-creation workshop. The results produced two key outcomes: the initial draft model for Digital Nang Talung and the designed puppet characters, which may be suitable for further 2D animation development in future studies. Furthermore, key themes were carefully extracted and will be used as important elements for consideration in the ongoing research.

Chapter 6 : Results of Study II: Interactive Design and Testing of Digital Nang Talung

6.1 Introduction

This study serves as a trial to digitize Nang Talung, building on the results of the previous research, this study utilized both survey and action research designs. It aims to answer RQ3: **How can tools such as 2D animation, augmented reality (AR markers), game design, and interaction design be employed to create a novel form of Digital Nang Talung that enhances users' knowledge, attitudes, and practices (KAP)?**

Based on participant input and suggestions from the previous study, the researcher developed the first version of Digital Nang Talung. This development included creating story content, characters, scenes, and a controller for manipulating a virtual puppet. The interaction process was tested using the initial version of Digital Nang Talung Alpha Version (https://digitalung.itch.io/nang-talung-book), which is designed as a site-specific theatre platform where the virtual world intersects with the traditional Nang Talung performance.

To address RQ3, the study evaluated users' knowledge, attitudes, and skills (practices) before and after engaging with Digital Nang Talung (Alpha Version).

6.2 The development of Digital Nang Talung (Alpha Version)

The researcher developed the Digital Nang Talung (Alpha Version), which included character design, scene design, animation, and motion graphics with sound effects, along with game design elements. This version was designed as a site-specific theatre platform featuring two-way communication.

6.2.1 Character design

In the previous study, participants collaborated by using their knowledge of Nang Talung and creativity to develop character designs for the new digitized form of Nang Talung. These designs were based on a blend of traditional Nang Talung characters and inputs from the Study I participatory co-creation workshop, resulting in the creation of new, innovative characters.

The characters developed (Table 6.1) include a mix of modern figures, such as Praewta, Manee, and the Green Ogre, alongside characters styled in the traditional shadow puppet aesthetic. Each character is designed with a unique movement style inspired by its traditional story representation.

The design was also influenced by the selected content story for this study, *Nam Jai Mae*, which aimed to merge modern and traditional visual elements. The modern characters like Praewta, Manee, and the Green Ogre are designed to be easily recognizable and relatable to

contemporary audiences, while the other six characters—Teng, Nu Nui, Sikeo, Yot Tong, Khwan Muang, and Samor—are rooted in traditional Nang Talung.

To appeal to younger audiences, the traditional characters were given playful and engaging animations. For example, Samor was animated with a trembling tongue when speaking and uses an exaggerated pointing gesture to indicate who is talking, characteristic of traditional shadow puppet performances. Additional animated expressions such as laughing, crying, slapping, and angry hand movements were incorporated to bring the characters to life and enhance their entertainment value.

Character Name	Stylised Drawing	Animated Representation
Praewta		
Manee		
Green Ogre		
Teng		
Nu Nui		
Sikeo		

Yot Tong		
Khwan Muang		
Samor		

Table 6.1 Stylised drawing and animated character design

6.2.2 Scene Design

The Digital Nang Talung (Alpha Version) features four distinct scenes, each with its unique setting and environment, carefully crafted to enhance the storytelling experience and engage the audience. These scenes not only serve to progress the narrative but also immerse users in different aspects of the traditional and modern elements of Nang Talung.

Scene 1: Treasure Cave
This scene is set in a mysterious cave filled with glimmering treasures and ancient artifacts. It represents the allure of adventure and discovery, inviting users to explore and uncover hidden secrets. The Treasure Cave reflects traditional Nang Talung themes of mythical quests and heroism.

Scene 2: Gang of Monkeys
The Gang of Monkeys scene introduces playful and mischievous characters, drawing from folklore and comedic elements often found in traditional Nang Talung performances. This lighthearted tone adds variety to the narrative and provides a moment of comic relief.

Scene 3: Snow Mountain
Snow Mountain takes users to a serene, snow-covered landscape, presenting a striking contrast to the tropical settings typically associated with Nang Talung. This scene reflects an effort to modernize the visual experience by incorporating unconventional and imaginative environments.

Scene 4: The Magic Swamp
The Magic Swamp embodies the enchanting and supernatural elements often featured in Nang Talung stories. The otherworldly visuals captivate users, drawing them deeper into the narrative..

Each scene required distinct setting designs to match the narrative flow and maintain audience engagement. As illustrated in Table 6.2, the diverse environments allow users to experience the rich cultural heritage of Nang Talung while enjoying the interactive elements of a modern digital platform. The variety of settings and challenges not only enhance the story but also aim to educate and entertain players, bridging the gap between traditional art forms and contemporary digital experiences.

Scene Title	Scene Design
Treasure Cave	
Gang of Monkeys	
Snow Mountain	

Magic Swamp	

Table 6.2 Design of four distinct scenes

6.2.3 Animation, motion graphics and music

The design of the animation and motion graphics aimed to preserve the traditional appearance and movement style of Nang Talung. The use of two-dimensional (2D) animation was chosen because it closely resembles the traditional Nang Talung aesthetic, a preference expressed by the youth participants. In traditional Nang Talung, most puppet elements are static, with only the puppet's mouth and hands moving (Chathong, 1996). Additionally, intricate details are added through a unique embroidery technique, which affects how the puppets reflect light. As shown in Figure 6.1, this embroidery technique enhances visual details, a defining characteristic of Nang Talung as an objectified form of cultural capital. Therefore, maintaining these crisp and detailed projected images was a crucial aspect of the animation process.

Figure 6.1 The visual effect of puppet embroidery on projected images when viewed on a screen

Other traditional visual elements were integrated into the animation and motion graphics design by combining the traditional art form with the creative inputs from participants. These elements are summarized in Table 6.3.

Key Elements of Traditional Nang Talung	Animation and Motion Graphics
Electric light for casting shadows	Shadows must be crisp and clear
Embroidery for character details	Character features should be represented with embroidery-like designs
Diverse movement styles and choreography to convey various characters and situations	Multiple manipulation styles should be developed, enabling virtual puppeteers to express different stories. Basic movements such as joker walking, anger, slapping, crying, and laughing were included

Table 6.3 Key elements of traditional Nang Talung to be incorporated into the animation and motion graphics

An additional challenge in animation and motion graphics was synchronizing the puppet's mouth movements with their dialogue and overall character gestures. Each puppet was given its own distinct style of movement and voicing. For instance, the character Nu Nui tends to nod while speaking and raises his hands to emphasize certain words. In contrast, the character Teng moves to the center of the screen if delivering a longer dialogue. These distinctive character movements, coordinated with speech, were carefully incorporated into the animation to maintain authenticity.

The final component of this design phase was the music. For this version, a single traditional song titled Kangkauw Kin Kluay ("Bat Eating Banana") was used. The music was recorded using synthesized versions of traditional instruments, including cymbals, drums, gongs, and clarinets, as depicted in Figure 6.2. The musical arrangement for the Digital Nang Talung Alpha version was deliberately simplified. This approach was taken to focus on basic elements, but it was noted that future versions could benefit from incorporating a more authentic and complex musical score, drawing upon Nang Talung's rich musical heritage.

| Clarinet | Cymbals | Drums | Gongs |

Figure 6.2 Musical instruments for Nang Talung

6.2.4 Game design elements

Based on feedback from the youth participants, the game design aimed to be both challenging and engaging, encouraging players to explore and discover more about the art of Nang Talung. This included various aspects such as storylines, graphic styles, control systems, and gameplay challenges (Zubek, 2020). The Digital Nang Talung project was designed as a "serious game," intended to both entertain users and educate them about the traditional practice of Nang Talung (Caserman et al., 2020).

The Digital Nang Talung (Alpha Version) functions as a site-specific theater platform with two-way communication. The design elements are as follows:

1. **Technology:** This aspect covers the technical setup, including the use of projectors, computers, mobile devices, and screens to display the performances.
2. **Content:** This includes digital assets such as story visuals, images, and animations that are used in the performance.
3. **Actors:** This refers to the people involved, such as puppeteers and users. The system offers two modes of interaction:
   ○ **Story Mode**
   ○ **Freestyle Mode**

In **Story Mode**, the game was implemented with a single storyline titled "The Kindness of Mother and Daughter". This narrative is divided into four scenes, featuring characters, music, dialogue, and challenges, as detailed in **Appendix C**. The plot centers around siblings Teng and Nu Nui, along with Aunt Praewta and her daughter, Manee. Throughout the story, Teng, Nu Nui, and Manee learn the art of Nang Talung from Aunt Praewta through a series of challenges. The game emphasizes themes of respect for elders and the importance of learning from older generations, while also imparting knowledge about the history, traditions, and techniques of Nang Talung.

Once the game design was finalized, it included animation, motion graphics, and music to enhance the interactive experience.

6.2.5 Augmented Reality (AR) Marker

In response to participants' feedback from Pilot Study on the digitized version of Nang Talung. An Augmented Reality (AR) Marker was developed to serve as a modern yet traditional controller. The goal was to replicate the experience of controlling Nang Talung puppets while integrating digital technologies. The AR Marker, in its first iteration (version 1.0), was carefully designed to closely resemble the traditional control sticks used by Nang Talung puppeteers in both function and appearance. This study is notably the first to develop an AR marker specifically modeled after traditional Nang Talung control sticks. Although this is a novel approach, it aligns with findings from Bui and Lovell (2024), who emphasize that AR can support the transmission of intangible cultural heritage by embedding traditional cultural elements within interactive experiences. Similarly, Tong and Kim (2021) demonstrate that immersive AR tools can enhance cultural learning by recreating traditional interactions in digital contexts. Galani and

Vosinakis (2024) also highlight that grounding digital interfaces in cultural authenticity helps foster deeper engagement and greater respect for heritage practices, especially when traditional objects are reimagined in virtual or augmented forms.

An AR Marker is essentially a visual symbol, often a printed 2D image, that acts as a trigger for augmented reality experiences on devices like smartphones or tablets. These markers serve as reference points for AR applications, allowing virtual content to be seamlessly overlaid onto the physical world. This technology was selected for its ability to create a bridge between the traditional art form of Nang Talung and modern interactive digital experiences.

In designing the AR Marker version 1.0, several key aspects were taken into consideration. First, the markers were created with distinct, high-contrast patterns inspired by traditional Nang Talung puppetry, making them easily recognizable by AR algorithms. These patterns included custom designs that reflected the aesthetic of Nang Talung puppets, using shapes and edges that could be efficiently tracked. The markers were also designed to be flat and printable, ensuring they were accessible for users to use with minimal setup.

The tool used to create Digital Nang Talung is the Unity Engine, a popular game engine. For the AR marker, Vuforia, an augmented reality SDK (Software Development Kit) is used to recognize the markers on the sticks.

The underlying mechanism of the AR Marker involves computer vision algorithms that detect and interpret these patterns using a web camera. When a user points the AR Marker to web camera, a series of steps take place:

1. Capturing the Image: The device's camera captures a live feed of the environment, including the AR Marker.
2. Preprocessing the Image: The captured image is often converted to grayscale, simplifying the detection process and improving speed.
3. Detecting the Marker: The system analyzes the image to extract key features such as corners, edges, and distinct geometric shapes.
4. Calculating Position and Orientation: Once identified, the marker's position, orientation, and scale relative to the camera are calculated.

When the AR Marker is detected, it functions much like a traditional Nang Talung control stick, allowing users to manipulate digital puppets on screen. This includes controlling various puppet movements, such as walking, dancing, and waving.

The development process for AR Marker version 1.0 began with conceptualizing how this digital controller could replicate the tactile experience of traditional puppetry. Specific markers were designed to control different character movements and trigger special animations. For example, one marker might make a puppet walk, while another could make it perform a traditional gesture or speak.

To ensure the markers were effective, the designs incorporated unique geometric patterns and high-contrast black-and-white motifs inspired by traditional Nang Talung art. These designs not only enhanced recognition by the camera but also stayed true to the cultural aesthetic. Additionally, elements like silhouettes of puppets and traditional Thai patterns were included to maintain the authenticity of the art form.

The integration of AR technology with the Digital Nang Talung was accomplished using the Unity game engine. This allowed for seamless mapping of AR Marker patterns to specific puppet movements, enabling an interactive and immersive experience for users.

In summary, the AR markers are designed to resemble the traditional sticks used by puppeteers in Nang Talung. In fact, puppeteers possess their own implicit knowledge, attitudes, and practices (KAP) related to all aspects of the performance. Based on this concept, the goal is to transfer the puppeteers' implicit knowledge to new or prospective users (puppeteers). The AR markers are used to control and perform with the digital version of Nang Talung. KAP is then used as a framework to assess whether this knowledge has been successfully transferred and embodied by the newcomers.
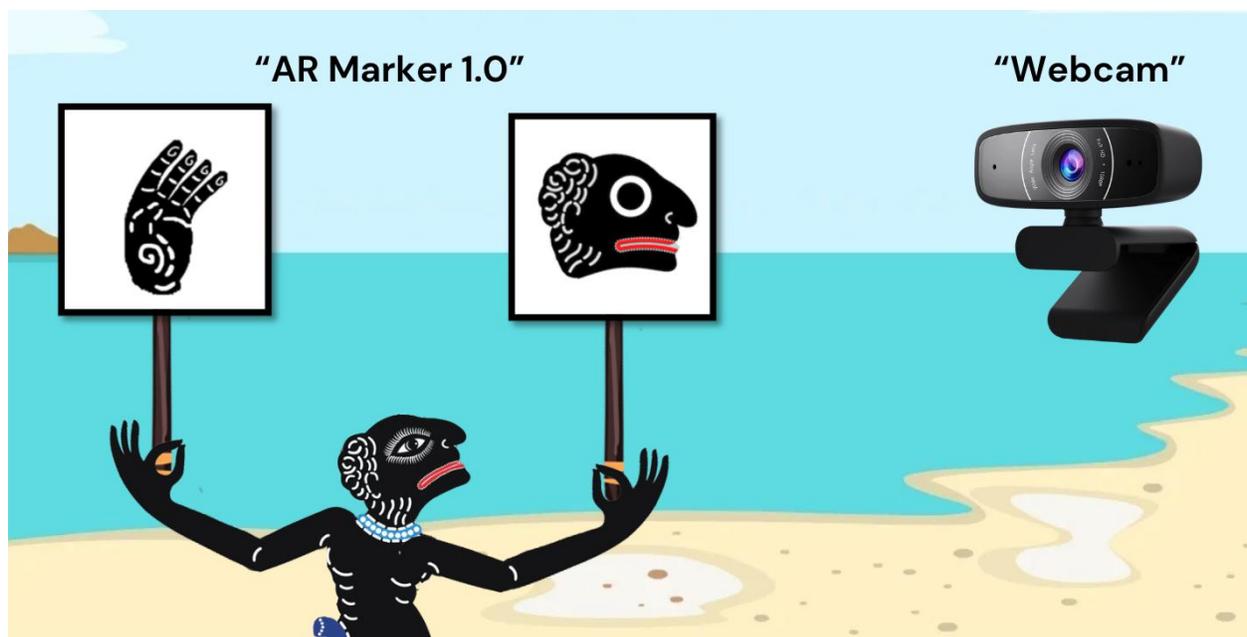
Figure 6.3 Illustration of the AR Marker version 1.0 and the web-camera device

6.2.6 The Digital Nang Talung (Alpha Version)
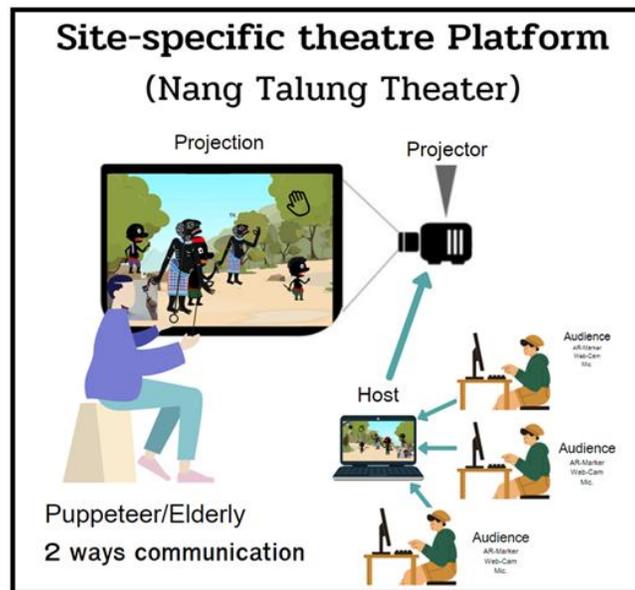
Figure 6.4 Digital Nang Talung Alpha Version

Figure 6.4 illustrates the composition and workflow of the Digital Nang Talung Alpha Version (https://digitalung.itch.io/nang-talung-book), focusing on a site-specific theatre platform designed as the first version to digitize Nang Talung. This version comprises four main elements:

1. Expert Puppeteer (EP):
   ○ The puppeteer is represented as an expert with extensive experience in traditional Nang Talung. They control traditional puppets on the screen while simultaneously interacting with digital puppets.
   ○ A 2-way communication feature enables real-time interaction between the puppeteer and youth participants, creating an engaging experience where the puppeteer can respond to the audience's reactions.
2. Digital Projection:
   ○ The performance crafted by the expert puppeteer is projected onto a large screen, while youth participants send their digital puppets from their devices through a projector, contributing to a collaborative performance.
3. Host System:
   ○ A central host (operating on a laptop) manages the broadcast and streaming of the performance. This system oversees the projection and coordinates communication between the expert puppeteer and youth participants.
4. Remote Audience (Youth Participants):
   ○ Youth participants engage remotely from their own devices (computers). Each participant has access to additional technology, including:
      i. AR-Marker Version 1.0: Augmented Reality markers that enable participants to control their own digital puppets, overlaid onto their physical environment through a web camera.

ii. Microphone: Enables 2-way communication, allowing participants to interact vocally with the expert puppeteer, fostering a dynamic and interactive performance.

Therefore, the Digital Nang Talung Alpha Version offers distinct features as the first version for digitizing Nang Talung in three key aspects:
- It enables a hybrid, interactive theatre experience where a traditional Nang Talung performance is adapted into digital formats.
- The platform supports both in-person and remote engagement, allowing the puppeteer to connect with a broader audience.
- The setup leverages digital projection, real-time interaction, and augmented reality tools to preserve and modernize the traditional art form of Nang Talung.

Overall, this design enhances accessibility and preserves the cultural heritage of Nang Talung by integrating traditional storytelling with modern digital tools.

6.3 The Digital Nang Talung Alpha Version: an interactive phase and testing

Following the completion of the initial design and development stage of the Digital Nang Talung Alpha Version, the trial phase (second step) was set up to evaluate its effectiveness. This study was conducted at Prince of Songkla University (PSU). The trial involved 20 purposively sampled students from the Digital Media BSc program at the Prince of Songkla University International College (Hat Yai Campus). Additionally, 2 expert puppeteers participated in this phase.

Demographic data of the 20 participants are presented in Table 6.4. The majority of participants were male (60%). Most were aged between 18-22 years, with an average age of 19 years. Among them, 65% were second-year students, and 60% had prior experience with Nang Talung.

Demographic Data	N	%
Gender		
Male	12	60.00%
Female	8	40.00%
Age (Years)		
18	2	10.00%
19	11	55.00%
20	2	10.00%
21	2	10.00%
22	3	15.00%
Current Status		
First year students	2	10.00%
Second year students	13	65.00%
Third year students	5	22.00%
Experienced with Nang Talung		
Yes	12	60.00%

No	8	40.00%

Table 6.4 Participants' Demographic Data

Before trialing the Digital Nang Talung Alpha Version, the youth participants were assessed for their knowledge, attitudes, and practices (KAP) regarding Nang Talung. The assessment revealed that only 60% of the youth had prior exposure to traditional Nang Talung. The KAP self-administered questionnaire was evaluated for internal consistency using the Kuder-Richardson-20 (KR-20) coefficient. The reliability score (KR-20) for knowledge = 0.886, attitude = 0.667 and practice = 0.914 (indicating high, moderate, high reliability respectively).

Additionally, workshops, focus groups, observations, and interviews were conducted, following the topic guidelines outlined in Table 3.3.

Both the expert puppeteers (EP) and the youth group (YG) participated in playing the Digital Nang Talung Alpha Version at the PSU theatre site using their own devices. The game featured both story mode and freestyle mode. A brief overview of the story content, character design can be found in Appendix B part 2, Appendix C and Appendix D, and AR Marker Version 1.0 with a demonstration video available at https://www.youtube.com/watch?v=_KO7Ib0ciHU

After playing the Digital Nang Talung Alpha Version, participants completed a self-administered KAP questionnaire and satisfaction surveys that covered four key aspects: game content, game design, website format, and perceived benefits and usability.

Additionally, focus groups, workshops, and observations were conducted to explore participants' social engagement, enjoyment, and other related factors. Focus groups and interviews served as methods to gather in-depth insights. The data collected from these activities were analyzed using thematic analysis.

To address **RQ3**—*How can tools such as 2D animation, augmented reality (AR markers), game design, and interaction design be employed to create a novel form of Digital Nang Talung that enhances users' knowledge, attitudes, and practices (KAP)?*—a pre- and post-assessment of KAP regarding the Digital Nang Talung Alpha Version was conducted. Inferential statistical analysis using paired-samples t-tests revealed statistically significant differences in participants' KAP before and after engaging with the Alpha Version ($P < 0.01$), as shown in Table 6.5. Because the same 20 participants completed both assessments, the paired comparison design allows the differences to be interpreted as statistically significant increases from pre-test to post-test.

As presented in Table 6.5: The Mean Differences in Pre-Test and Post-Test for Knowledge, Attitude, and Practice, the results were as follows:
- **Knowledge:** $t(19) = 10.356$, $p < 0.001$
- **Attitude:** $t(19) = 10.0809$, $p = 0.001$
- **Practice (Skills):** $t(19) = 12.457$, $p < 0.001$

All analyses were conducted using a consistent significance threshold of P < 0.01.

To ensure that interpretation is not based solely on p-values, effect sizes (Cohen's d for paired samples) were calculated using the formula $d = t / \sqrt{n}$ (n = 20). The resulting effect sizes were:
- **Knowledge:** $d \approx 2.31$ (very large effect)
- **Attitude:** $d \approx 2.25$ (very large effect)
- **Practice (Skills):** $d \approx 2.79$ (very large effect)

These values substantially exceed the conventional benchmark for a large effect ($d \geq 0.80$) as proposed by Cohen (1988), indicating that the observed differences are not only statistically significant but also practically substantial. In particular, the largest effect was observed in Practice (Skills), suggesting strong behavioral engagement following interaction with the artefact.

While KAP assessment is commonly used in health sciences, its limitations in capturing complex cultural practices have been noted. Launiala (2009) demonstrates that KAP surveys alone are insufficient for understanding nuanced attitudes and behaviors, emphasizing the need for **embodied and contextual approaches**. Similarly, Bolarinde et al. (2020) observe that knowledge does not automatically translate into practice, and Sirijoti et al. (2014) show that inadequate knowledge often leads to inappropriate attitudes and behaviors. Collectively, these studies highlight the central role of **knowledge (K)** as the foundation for behavioral change, which must be coupled with active engagement to meaningfully influence practice. A broader sociological perspective, as discussed in *Animated Bodies in Immunological Practices* (Bischur, 2011), reinforces the idea that KAP frameworks can facilitate **embodied learning and engagement**. By prompting participants to reflect on what they know, how they feel, and what they do, KAP assessments can initiate processes of self-awareness and bridge the gap between abstract knowledge and lived practice.

Within this study, the statistically significant paired-sample differences and very large effect sizes confirm that RQ3 is successfully addressed. The Digital Nang Talung Alpha Version did not merely produce statistically detectable change; it generated changes of substantial magnitude across knowledge, attitudes, and practices.

The Digital Nang Talung prototype **transformed the traditional KAP framework into a tool for embodied learning and engagement**. By physically manipulating digital puppets using AR markers, participants did not simply report knowledge and attitudes they actively enacted them in culturally meaningful ways. The physical manipulation connected users with the cultural tradition and that it became a form of cultural expression. This experiential interaction bridged the gap between abstract understanding and practical expression, enabling users to internalize the cultural essence of Nang Talung while improving their KAP. When embedded in an interactive and participatory framework, KAP assessment thus moves beyond static measurement to become a mechanism for **cultural learning, reflection, and engagement**.

Knowledge	N	Mean	SD	t-value	Sig.* (P < 0.01)
Pre-test	20	5.60	1.314	10.356	0.000*
Post-test	20	8.50	1.469		
Attitude	**N**	**Mean**	**SD**	**t-value**	**Sig.* (P < 0.01)**
Pre-test	20	25.90	0.480	10.0809	0.001*
Post-test	20	38.60	0.295		
Practice (Skills)	**N**	**Mean**	**SD**	**t-value**	**Sig.* (P < 0.01)**
Pre-test	20	2.19	0.224	12.457	0.000*
Post-test	20	4.95	0.933		

Table 6.5 The mean differences in pre-test and post-test for knowledge, attitude and practice

To assess participants' satisfaction with the game content, game design, website design, benefits, and usage of the Digital Nang Talung Alpha Version, the means and standard deviations were calculated to explore the central tendency of satisfaction. In addition to standard measures, the intervals were adjusted to better indicate the general level of agreement on the satisfaction scale. This adjustment was made by dividing the range by the mean, following the method described by Sullivan and Artino (2013). The satisfaction scale was interpreted as follows:
- 1.00 to 1.79: Not at all satisfied
- 1.80 to 2.59: Slightly satisfied
- 2.60 to 3.39: Somewhat satisfied
- 3.40 to 4.19: Strongly satisfied
- 4.20 to 5.00: Very strongly satisfied

The results show that participants were strongly satisfied across all four aspects mentioned. These findings are presented in Tables 6.6, 6.7, 6.8, and 6.9.

Satisfaction with Game Content	Mean	SD	Mean Interpretation
1. Content is clear, accurate and reliable.	4.00	0.562	Strongly Satisfied
2. Information and images are attractive.	3.45	0.945	Strongly Satisfied
3. Amount of content is sufficient.	3.50	0.946	Strongly Satisfied
4. Sorting of content was appropriate.	4.05	0.605	Strongly Satisfied
5. Classification is easy to understand.	3.90	0.553	Strongly Satisfied
6. Text is easy to understand.	4.15	0.813	Strongly Satisfied

	Mean	SD	Mean Interpretation
7. Content and images are consistent.	3.85	0.745	Strongly Satisfied
Overall Satisfaction with Game Content	3.84	0.780	Strongly Satisfied

Table 6.6 Means and standard deviations of satisfaction with Digital Nang Talung Alpha Version: Game Content

Satisfaction with Game Design	Mean	SD	Mean Interpretation
1. I like Scene 1 (Prelude).	3.85	0.813	Strongly Satisfied
2. I like Scene 2 (Classroom at the Temporary Cabin).	3.60	0.681	Strongly Satisfied
3. I like Scene 3 (Adventure in the Deep Forest).	3.80	0.696	Strongly Satisfied
4. I like Scene 4 (Crossroads: Choice Between Life and Death)	4.05	0.887	Strongly Satisfied
5. The game helps you know the characters.	3.95	0.605	Strongly Satisfied
6. The game helps you learn about Nang Talung.	4.05	0.605	Strongly Satisfied
7. The game helps you learn how to do shadow play.	4.10	0.718	Strongly Satisfied
8. The game teaches you the value of shadow play.	3.80	0.951	Strongly Satisfied
9. The game encourages me to conserve Nang Talung.	3.80	0.894	Strongly Satisfied
10. The game lets young people access Nang Talung.	3.85	0.988	Strongly Satisfied
Overall Satisfaction with Game Design	3.89	0.791	Strongly Satisfied

Table 6.7 Means and standard deviations of satisfaction with Digital Nang Talung Alpha Version: Game Design

Satisfaction with Website Design	Mean	SD	Mean Interpretation
1. Website formatting is easy to read and use.	4.00	0.649	Strongly Satisfied
2. Beautiful, modern and interesting.	3.45	1.050	Strongly Satisfied
3. Design colours are appropriate.	3.80	0.696	Strongly Satisfied

4. Background colour and font is suitable.	3.90	0.641	Strongly Satisfied
5. Font size and style are beautiful and easy to use	3.75	0.910	Strongly Satisfied
6. Display speed is adequate.	3.85	0.813	Strongly Satisfied
7. Characters are interestingly designed.	3.80	1.152	Strongly Satisfied
8. Characters are used appropriately.	4.20	0.696	Very Strongly Satisfied
9. Design of postures and movements is accurate.	3.50	0.946	Strongly Satisfied
Overall Satisfaction with Website Design	3.81	0.866	Strongly Satisfied

Table 6.8 Means and standard deviations of satisfaction with Digital Nang Talung Alpha Version: Website Design

Satisfaction with Benefit and Usage	**Mean**	**SD**	**Mean Interpretation**
1. Content is useful and can be applied.	4.00	0.725	Strongly Satisfied
2. The website makes it easier to access Nang Talung.	4.00	0.725	Strongly Satisfied
3. The website is a source of knowledge.	4.25	0.639	Very Strongly Satisfied
4. The website is a source of information that meets user needs.	3.60	0.883	Strongly Satisfied
Overall Satisfaction with Benefit and Usage	3.96	0.770	Strongly Satisfied

Table 6.9 Means and standard deviations of satisfaction with Digital Nang Talung Alpha Version: Website Design

Summary of Participants' Feedback, Observations, Interviews, and Focus Groups

The Youth Participants' Suggestions
1. Game Content and Game Design:
   Participants expressed concerns about the play's duration, with some feeling it was too short and not engaging enough. They suggested adding more plays, a wider variety of puppet characters, and clearer guidance on how to manipulate the puppets. Many wanted more challenging gameplay and additional content to enhance their experience, which will be taken into account for future updates. Key points included appreciation that the educational content was easy to understand and that the story mode provided complete information about Nang Talung. However, participants felt the scenes could better reflect Thai culture, and adding elements like background music would improve

engagement. They also suggested making the gameplay less like a questionnaire by increasing both the number and difficulty of questions to promote deeper learning.

2. Website Design:
   Several technical issues were identified, particularly in the free-style mode. Participants recommended incorporating English dialogue, Thai subtitles for Southern dialects, and improving dubbing and character movements to better align with the traditional visual appeal of Nang Talung. Specific feedback highlighted occasional malfunctions with puppet arms and mouths, recommendations to enhance puppet decorations and add more characters, and the need for more extensive puppet movement capabilities. Some puppets slipped out of the frame, prompting a suggestion to add containment features. There were also issues with puppet layering obscuring menus, unclear instructions on some screens causing confusion, and challenges with readability due to content order and color choices. Participants recommended scenes depict typical rural Thai environments and suggested adding sound controls since background music sometimes overpowered the spoken dialogue.

3. Benefits and Usage:
   Some participants questioned the relevance of Nang Talung to contemporary youth, suggesting the game might be best targeted toward those with a specific interest in traditional arts. Despite this, many found the content informative and saw the game as a useful learning tool for exploring Nang Talung.

4. Puppet Character Design:
   Participants noticed inconsistencies in mouth movements and suggested making puppet controls more intuitive. They recommended adding rotation and tilting features to better replicate traditional Nang Talung performances. Expanding the variety of puppet characters and providing additional background information about them were also highlighted.

5. AR Marker:
   The hands-on puppet manipulation feature was a strong recommendation. Participants requested more detailed instructions and testing on puppet manipulation techniques. Improvements to head and hand tracking for better responsiveness to the AR markers were also suggested.

Observations on Social Interaction and Enjoyment

Social Interaction:
During the session, social exchanges between participants and expert puppeteers were observed. While the students appeared friendly, their interaction with each other. However, a notable pattern emerged in their engagement with the expert puppeteers. Many participants sought guidance from these experts on how to manipulate the puppets, and these moments were particularly valuable. These intergenerational interactions not only enhanced the learning experience but also supported the transmission of cultural knowledge from traditional practitioners to the younger generation.

Enjoyment:
Enjoyment relates to the pleasure or happiness the participants experienced (Kawabata and Mallett 2022). Indicators of these observations included laughter, positive questions, and self-competition during gameplay, especially among male participants who explored various ways to manipulate the game characters.

Expert Interviews

Two in-depth interviews were conducted with Nang Talung experts from Songkhla Province. These experts, both active in preserving Nang Talung, shared insights on the strengths and weaknesses of the Digital Nang Talung:

Strengths:
The experts praised the Digital Nang Talung for its clear and visually appealing presentation, noting that it successfully encouraged users to explore traditional Nang Talung further. They also highlighted the interactive design as a key strength, especially in its potential to attract younger audiences who might otherwise be unfamiliar with this cultural tradition. Additionally, the portability and flexibility of the digital version—being accessible anywhere—was seen as a major advantage for expanding reach and awareness.
Weaknesses:
Despite its strengths, the experts identified several areas for improvement. They noted that puppet manipulation in the digital format remained quite difficult, echoing the complexity of traditional Nang Talung performance. This indicated a need for a tutorial or learning mode to help users become more comfortable with the controls. They also felt that the storyline could be shortened to better maintain user interest. Furthermore, the experts cautioned that traditionalists might resist the digital version if it strays too far from the original art form.
Opportunities for Improvement:
To enhance engagement, the experts recommended expanding the game's visual and narrative content—such as adding more puppet characters, diverse settings, and richer storylines. They also suggested incorporating modern themes to better connect with younger users, while still retaining the traditional Nang Talung music to preserve its cultural essence.

Focus Groups
The focus groups involving 20 student participants provided additional insights into the reception and potential of the Digital Nang Talung. The discussions were guided by the topic outline presented in Table 3.3.

Participants generally agreed that the game improved accessibility to Nang Talung, making it easier for modern audiences to learn about and engage with this traditional art form. However, many felt that the game's design was more suitable for younger children rather than older teens or adults. To broaden its appeal, they recommended introducing customizable features, such as user-driven character design, and increasing the difficulty levels to create a more challenging experience.

Several technical limitations were also noted. Participants reported difficulties using AR markers and expressed a desire for a wider variety of puppet options. Many also suggested adding more exploratory features to allow users to interact more freely with the game environment.

In terms of promotion, students recommended using popular social media platforms—such as Facebook and Instagram Stories—as effective channels to reach and engage younger audiences.

While concerns were raised about maintaining a respectful balance between modern digital elements and traditional Nang Talung aesthetics, the overall sentiment was positive. Participants believed that, with thoughtful promotion and cultural sensitivity, the Digital Nang Talung has strong potential to raise awareness and appreciation of this heritage art among the youth.

6.4 Chapter Summary

This study addresses RQ3: **How can tools such as 2D animation, augmented reality (AR markers), game design, and interaction design be employed to create a novel form of Digital Nang Talung that enhances users' knowledge, attitudes, and practices (KAP)?** The design and development process focused on creating the Digital Nang Talung Alpha Version, which includes nine character designs, scene setups, as well as animations, motion graphics, and music. The game design integrates technology, content, and character interactions, resulting in two modes: Story Mode and Freestyle Mode. Additionally, the Augmented Reality (AR) Marker version 1.0 was developed to allow users to manipulate virtual puppets in a way that mimics traditional stick manipulation.

The Digital Nang Talung Alpha Version serves as a site-specific theatre platform, enabling a hybrid, interactive theatre experience by transforming a traditional Nang Talung performance into a digital format. This approach allows puppeteers to engage with a broader audience using real-time interaction and augmented reality tools, helping to preserve and modernize the traditional art form of Nang Talung.

To evaluate the research question, participants interacted with the Digital Nang Talung Alpha Version. Pre- and post-test self-administered questionnaires on KAP (Appendix A) were conducted to assess the effectiveness of this application. A statistical t-test revealed a significant improvement ($p < 0.01$) in KAP scores before and after engaging with the Digital Nang Talung Alpha Version. This interaction enhanced knowledge, attitude and skill sharing between different generations.

Additional qualitative feedback was gathered through focus groups, observations, and in-depth interviews. Participants provided valuable insights and suggestions, highlighting areas for improvement in game content, design, website usability, and user experience. The feedback revealed that while participants appreciated the educational value and interactive elements, they recommended enhancing the visual appeal, adding more challenging content, and incorporating additional features to better engage younger audiences.

The findings suggest that the Digital Nang Talung Alpha Version successfully combines traditional cultural elements with modern digital technology, fostering a deeper connection between users and the art form. The chapter concludes by emphasizing the importance of balancing tradition with innovation to ensure the preservation and modernization of Nang Talung for future generations.

Chapter 7 : Results of Study III: Bridging the Generation Gap with Digital Nang Talung

7.1 Introduction

Study III builds upon the findings of Study II, focusing on the ongoing development of Digital Nang Talung. This chapter presents the Digital Nang Talung Beta Version (https://digitalung.itch.io/digi-nang-talung), which incorporates enhancements to the Alpha Version based on participants' feedback and suggestions. The primary objective is to improve the application and explore its ability to bridge generational gaps while fulfilling real-world needs as a form of folk media.

This study also seeks to answer RQ4: **How can Digital Nang Talung bridge the generational gap and address real-world needs as a form of folk media?**

To validate the final version of Digital Nang Talung, the study utilized a mixed-method design that combined action research and surveys. The focus was on testing the platform's potential for full online accessibility, aligning with the principles of digital arts and tools. These methods aim to ensure that Nang Talung can be sustained in a modern world, effectively bridging the gap between younger and older generations.

7.2 The development of Digital Nang Talung Beta Version

The Digital Nang Talung Beta Version was developed based on participants' feedback and suggestions for improving the Alpha Version. Key areas of enhancement included scene design, character development, and the accuracy of AR Marker Version 1.0. Additionally, efforts were made to address challenges in game design and incorporate contemporary content to make the experience more engaging.

These updates aimed to enhance visual appeal, add more challenging and dynamic content and increase interactivity to provide a more enjoyable user experience. These refinements were implemented to create a more compelling and modernized version of Digital Nang Talung while preserving its traditional roots.

7.2.1 Character design

Based on participants' feedback requesting more puppet character designs, ten preset characters were developed: Nunui, Teng, Yottong, Sikeo, Poon, Khwan Muang, Tho, Samore, Hermit, and Giant.

Users can select these puppets and further customize their appearance according to their preferences. Customization options include hairstyles, skin tones, shirts, pants, and accessories

like eyeglasses. The Beta Version also incorporates more fantastical elements into character customization, allowing for greater creativity and personalization (Figure 7.1).

This enhancement aligns with a user-driven character design approach, ensuring the game meets diverse user expectations and preferences.
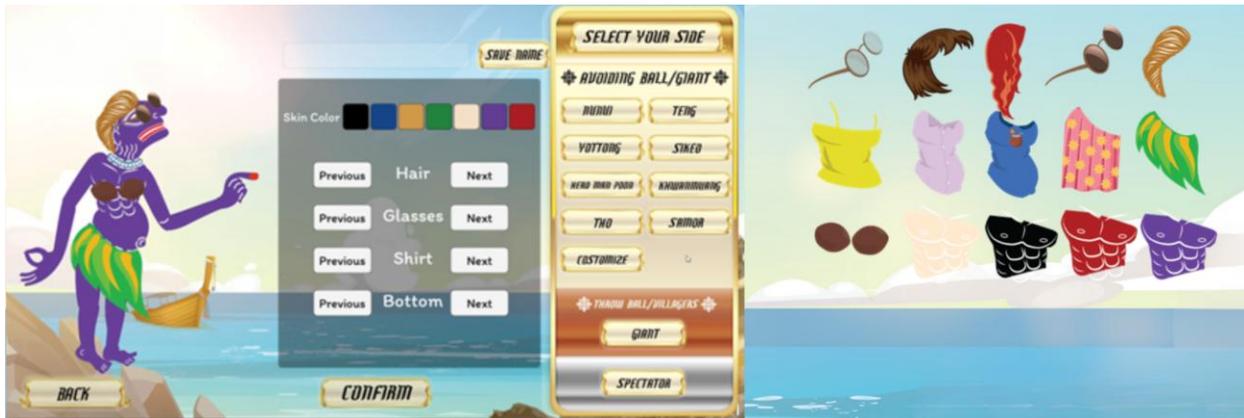
Figure 7.1 User-driven character customization

7.2.2 Scene design

In the previous version of the application (Digital Nang Talung Alpha Version), four scenes were designed: The Treasure Cave, Gang of Monkeys, Snow Mountain, and The Magic Swamp (Table 6.2). Participants suggested that the scenes should depict more typical rural areas to better align with the traditional Nang Talung context.

Based on this feedback, five new scenes were developed and upgraded for the Beta Version: The Forest, The Beach, The Fishing Village, The Temple and The Classical Nang Talung Theater. (Table 7.1)

These scenes are presented with intricate graphics and carefully crafted backgrounds, ensuring a visually appealing and culturally authentic experience. The updated designs aim to immerse users in settings that resonate with traditional Thai culture while enhancing the overall storytelling and engagement of Digital Nang Talung.

Scene Title	Scene Design
The Forest	
The Beach	
The Fishing Village	
The Temple	
The Classical Nang Talung Theater	

Table 7.1 Design of five distinct scenes

7.2.3 Animation, motion graphic and music for game design elements

While participants expressed satisfaction with the Digital Nang Talung Alpha Version, their suggestions, observations, and interview feedback highlighted areas for improvement. For instance, puppet movements in Freestyle Mode, such as arm and mouth malfunctions, were noted. Additionally, inconsistencies in mouth synchronization and a desire for more engaging gameplay, contemporary content, and sound control options were mentioned. Participants also suggested that the storyline be more concise to sustain younger audiences' interest.

In response, the Digital Nang Talung Beta Version focuses on integrating improved animations, motion graphics, music, game content, and design. The Beta Version also includes bilingual options (English and Thai) and allows players to adjust audio levels, including background music and sound effects. Three game modes are featured, as demonstrated in the linked video: https://www.youtube.com/watch?v=XeaAVwIdSO8

Modes in the Beta Version
1. Nang Talung Theater
2. Freestyle Mode
    2.1. Dodge COVID Ball
    2.2. Fight the Giant
3. Story Mode: Introduction to Nang Talung

Nang Talung Theater Mode
This multiplayer mode creates a virtual puppet theater experience, allowing users to connect via webcam, AR controller, internet, and microphone. Players interact with one another and the puppet master in the same scene, simulating a traditional puppet theater environment.

Features of Theater Mode:
- Pre-Set Characters: Nine pre-designed characters (Nu Nui, Teng, Yot Tong, Sikeo, Poon, Khwan Muang, Tho, Samore, Hermit, and Giant).
- Customization: Players can personalize characters by modifying features such as hair color, glasses, shirts, and pants.
- Customizable Scenes: Choose from five rural-themed settings (beach, forest, temple, fishing village, and classical Nang Talung theater).
- AR Marker Version 2.0: Enhanced tracking efficiency for smoother interactions.

Players can either create a private room with their chosen scene or join an existing one. Real-time communication via microphone and character control using AR tools enables a seamless and immersive experience.

Freestyle Mode (Multiplayer Mini-Game Mode)
Freestyle Mode introduces two multiplayer mini-games inspired by Thai children's games, offering educational and cooperative gameplay that emphasizes virtual socialization.

Mini-Games:
1. Dodge COVID Ball
    ○ This game mirrors dodgeball but incorporates COVID-19 prevention themes.
    ○ Gameplay: Players choose to either play as a giant throwing virus balls or villagers dodging them. Villagers can collect alcohol gel bottles to block hits and aim to survive the 2-minute game duration.
2. Fight the Giant
    ○ Villagers battle a giant by shooting alcohol gel bottles at it.
    ○ Gameplay: The goal is to deplete the giant's Hit Points while avoiding its attacks. If the villagers lose all their hearts, the giant wins.

Within this framework, COVID-19 prevention knowledge is not introduced as an external or parallel research strand, but as a representative contemporary issue that stands in for modern societal challenges. Throughout its historical development, Nang Talung has incorporated current social concerns, political critique, and emerging realities into its narratives (Dowsey-Magog, 1994; 2002). Traditionally, the puppeteer (Nai Nang) plays a central role not only as a performer but also as a cultural mediator and commentator. Through improvisation, the puppeteer often introduces commentary on contemporary social issues, community concerns, and moral lessons relevant to the audience. This adaptive storytelling practice allows Nang Talung performances to remain socially responsive while preserving their cultural structure. The integration of COVID-19 themes therefore continues this adaptive tradition. It operationalizes the thesis' core argument that intangible cultural heritage is dynamic, socially responsive, and capable of modernization without losing its cultural essence.

In the digital adaptation, COVID-19 is embedded through two interactive mini-games, which function as contemporary narrative extensions of traditional performance logic rather than as separate health education modules. In Dodge COVID Ball, the structure mirrors traditional conflict scenes common in shadow play. Players may assume the role of a giant throwing virus balls or villagers attempting to survive. Villagers collect alcohol gel bottles as protective tools, symbolically reinforcing preventive behavior while surviving a timed two-minute encounter. In Fight the Giant, villagers collaborate to defeat a giant by throwing alcohol gel bottles to reduce its Hit Points while avoiding attacks. The gameplay mechanics translate the archetypal struggle between villagers and powerful antagonists central to Nang Talung storytelling into an interactive digital format.

Importantly, the "giant" functions as a culturally resonant metaphor. In traditional Nang Talung, giants often symbolize chaos, immorality, or social threats. In this digital reinterpretation, the virus assumes the symbolic role of a contemporary "giant," aligning public health messaging with established narrative structures. The alcohol gel bottle replaces traditional weapons, transforming prevention practices into symbolic tools of empowerment. In this sense, the digital system extends the communicative function traditionally performed by the puppeteer, translating narrative commentary and moral instruction into interactive gameplay mechanics.

Thus, the COVID-19 strand does not reposition the thesis as a public health intervention study. Rather, the mini-games serve as proof-of-concept demonstrations of how Digital Nang Talung

can preserve its instructional and community-oriented function within a contemporary crisis. By embedding COVID-19 within culturally meaningful narrative archetypes and gameplay structures, the research reinforces rather than fragments the central contribution of the thesis: the development of a digitally mediated model that sustains Nang Talung as living intangible cultural heritage while enabling intergenerational knowledge transfer.

Both games integrate fun and educational content, promoting awareness of COVID-19 prevention while engaging players (Figure 7.2).

Figure 7.2 Educational Game Content on COVID-19

Story Mode: Introduction to Nang Talung

The third mode, Story Mode, is an evolution of the teaching game from the Alpha Version. This single-player mode, titled "Introducing Nang Talung," follows the character Manee on a forest adventure to find ingredients to treat her sick mother. Designed to teach the history and significance of Nang Talung, this mode is now available on a webpage, ensuring wider accessibility.

The updates in animation, motion graphics, and music, along with these new modes and features, aim to create a more engaging, interactive, and educational experience in the Digital Nang Talung Beta Version.

7.2.4 Augmented Reality (AR) Marker

Participants in the AR Marker Version 1.0 session highlighted the importance of improving the user experience to strengthen their connection with the cultural essence of Nang Talung. They suggested enhancing the responsiveness of head and hand tracking so that movements would more accurately reflect users' physical actions with the AR markers. Many participants expressed that the manipulation should feel closer to traditional Nang Talung puppeteering, emphasizing the need for intuitive controls and a tutorial session to guide first-time users in performing culturally authentic gestures.

The workshop revealed that user engagement extended beyond the digital interaction itself, fostering meaningful social and cultural exchanges. Many participants actively sought guidance from expert puppeteers on how to hold, move, and perform with the AR markers. These intergenerational interactions allowed younger participants to feel part of a living tradition, as expert advice not only improved their manipulation skills but also reinforced the cultural significance of each movement. This process transformed the AR experience into an active form of cultural learning and expression.

Consequently, in this version AR Marker detection and accuracy have been significantly enhanced, featuring a distinct pattern designed for better recognition and processing by the camera. The updated AR Marker version 2.0 is illustrated in Figure 7.3.
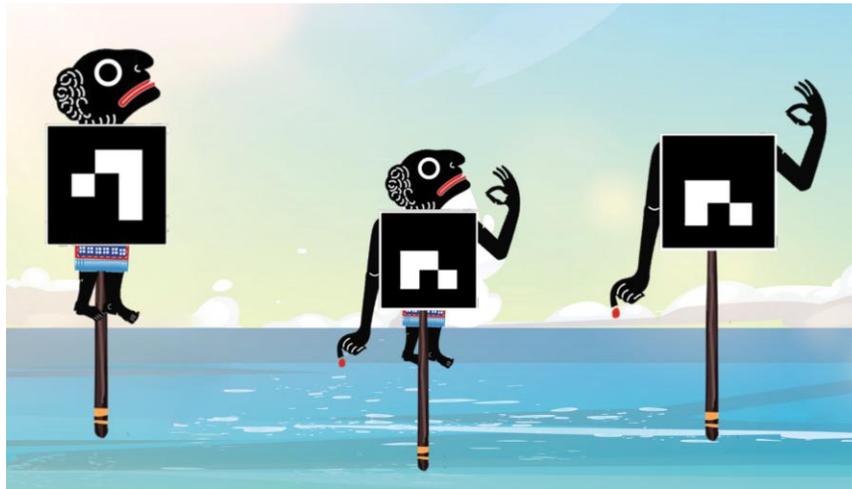
Figure 7.3 AR Marker version 2.0

Figure 7.3 illustrates augmented reality (AR) markers integrated into characters resembling traditional Nang Talung puppet figures. These AR markers are designed to enable the manipulation of virtual puppets.

The black squares with white patterns function as AR markers. Each pattern is unique and easily identifiable than version 1.0, allowing an AR application to detect and interact with them in a physical environment using a camera. When scanned, the AR system recognizes the specific marker and triggers a corresponding digital interaction. The AR application employs advanced

computer vision algorithms to identify the marker patterns in real time. Compared to version 1.0, these patterns offer significantly improved tracking speed and accuracy.

For physical integration, the markers are embedded within puppet-like designs, maintaining both visual appeal and cultural relevance. This approach preserves the traditional aesthetic of Nang Talung puppetry while seamlessly incorporating modern technology.

After completing all stages of development, the full online Digital Nang Talung Beta Version was finalized, featuring three distinct modes. To make this version more appealing and easier for users to remember, it has been renamed as **Digi Nang Talung**. The application is now available at https://digitalung.itch.io/digi-nang-talung

7.3 The Digital Nang Talung Beta Version: an interactive phase and testing

The **Digi Nang Talung Beta Version** was developed based on feedback to enhance its design, storyline, and accessibility. After completing the development process, an interactive testing phase was conducted to evaluate its usability, accessibility, and effectiveness in bridging the generational gap. The ultimate goal was to address real-world needs as a modern form of folk media.

A **purposive sampling technique** was used to select participants from both older and younger generations. Due to limitations on participants' access to devices and printers for printing AR markers, as well as the need for an orientation to guide first-time users on how to play each mode, the study site was set up at the College of Arts, Media, and Technology, Chiang Mai University (CMU).

The study employed a mixed-method approach combining action research and surveys. To test the fully online functionality of Digi Nang Talung, the research was divided into two models.

In this study, **"online" is operationally defined as interaction conducted through a web-based digital platform requiring internet-connected devices, where gameplay, narrative construction, and mini-games are mediated entirely by the system.** Both Model A and Model B accessed the same fully online application at: https://digitalung.itch.io/digi-nang-talung

The distinction between the two models does not concern technological modality (both are fully online), but rather the social configuration and facilitation structure during gameplay.

- **Model A**: A supported, co-located online condition where younger and older participants accessed the fully online application individually but interacted face-to-face within structured small groups.
- **Model B**: An independent, self-directed online condition where participants accessed and played the same fully online application individually without structured collaborative facilitation.

The demographic data for participants in Model A and Model B are presented in Tables 7.2 and 7.3. Most participants were born in northern Thailand and had limited prior engagement with Nang Talung.

For younger participants, whose ages ranged from 19 to 25 years, males made up the majority in both models, accounting for 81.80% in Model A and 72.70% in Model B. Among the 10 older participants, the average age ranged from 60 to 67 years.

	Younger Participants		Older Participants	
	Male	**Female**	**Male**	**Female**
Model A	18 (81.81%)	4 (18.18%)	2 (20.00%)	8 (80.00%)
Total Participants	22		10	
Model B	13 (72.22%)	5 (27.78%)	2 (20.00%)	8 (80.00%)
Total Participants	18		10	

Table 7.2 Number of participants by gender in each models

	Younger Participants		Older Participants	
	Age (Years)	**N (%)**	**Age (Years)**	**N (%)**
Model A	19	6 (27.27%)	60	2 (20.00%)
	20	2 (9.09%)	61	2 (20.00%)
	21	4 (18.18%)	62	2 (20.00%)
	22	6 (27.27%)	64	2 (20.00%)
	23	1 (4.55%)	65	2 (20.00%)
	24	2 (9.09%)		
	25	1 (4.55%)		
Total Participants		22		10
Model B	19	5 (27.78%)	60	1 (10.00%)
	21	6 (33.33%)	61	2 (20.00%)
	22	7 (38.89%)	62	1 (10.00%)
			63	2 (20.00%)
			64 - 67	4 (40.00%)

Total Participants		18		10

Table 7.3 Number of participants by age in each models

Orientation Process and Data Collection

Before the interactive workshop, participants attended an orientation session that included:

1. An introduction to the study.
2. Step-by-step guidance on how to use the AR Marker Version 2.0.
3. Instructions for engaging with each game mode.

Participants were asked to complete three self-administered questionnaires:

- Knowledge, Attitude, and Practice (KAP) Questionnaire
- Learning Engagement Questionnaire
- Usability Questionnaire

During the intervention workshop, additional data were collected through **observations**. The results and findings from this phase are as follows:

7.3.1 The Digi Nang Talung Beta Version: Model A

In this model, participants were divided into five small groups, each consisting of 4-5 younger participants and 2 older participants. Each participant used an individual internet-connected computer to access the fully online Digi Nang Talung Beta Version. However, they were physically co-present in the same room.

Although the platform was entirely web-based, the learning environment was socially supported and collaborative. Participants:

- Engaged in face-to-face discussion,
- Shared opinions and strategies verbally,
- Collaboratively created story content as a unified group,
- Reflected together across the three modes of the application.

The researcher provided orientation and facilitation, encouraging intergenerational dialogue and cooperative gameplay. Narrative construction and decision-making were conducted collectively, effectively positioning each group as a single collaborative user within the online system.

Operationally, Model A represents a **collaborative, co-located online learning environment**, where digital interaction is mediated by the web platform, but social interaction occurs face-to-face.

7.3.1.1 The pre-test and post-test assessment on KAP

The pre-test and post-test assessments of Knowledge, Attitudes, and Practices (KAP) were conducted using self-administered questionnaires. The results are shown in Table 7.4.

		Younger Participants		Older Participants		t-value	Sig.* (P < 0.01)
		Mean	SD	Mean	SD		
Pre-test	**Knowledge**	4.17	2.834	7.70	3.67	2.843	0.008*
	Attitudes	28.60	0.712	31.30	0.883	8.240	<.001*
	Practices	1.44	1.723	4.10	1.595	4.140	<.001*
Post-test	**Knowledge**	9.37	1.81	9.00	3.859	0.347	0.731
	Attitudes	31.86	1.569	32.90	2.100	1.398	0.172
	Practices	4.89	1.95	4.70	0.675	0.269	0.790

Table 7.4 The Mean Differences in KAP Scores Between Younger and Older Participants in Model A

Table 7.4 was analyzed using **independent-samples t-tests**, as the comparisons examine differences between younger and older participants at each time point (pre- and post-test). A consistent significance threshold of P < 0.01 was applied.

At the pre-test stage, statistically significant differences were found between age groups in all three domains:

- Knowledge: t = 2.843, p = .008
- Attitudes: t = 8.240, p < .001
- Practices: t = 4.140, p < .001

Effect sizes (Cohen's d) indicate that these were large to extremely large differences (approximately d ≈ 1.27 for Knowledge, d ≈ 3.68 for Attitudes, and d ≈ 1.85 for Practices). These results demonstrate substantial generational gaps prior to the intervention, with older participants scoring higher in Knowledge and Practices.

At the post-test stage, no statistically significant differences were detected between younger and older participants in Knowledge (p = 0.731), Attitudes (p = 0.172), or Practices (p = 0.790). The absence of significant between-group differences indicates that KAP scores converged across generations after the Model A workshop.

Importantly, because Table 7.4 reports **between-group comparisons**, the findings indicate generational differences at each time point rather than within-group improvement. However, descriptively, both groups showed higher post-test means compared to pre-test means. In Model A, younger (4-5 participants) and older (2 participants) engaged in small-group, face-to-

face collaboration while using the online Digi Nang Talung Beta Version. The disappearance of statistically significant differences at post-test suggests that the supported, intergenerational format was associated with a reduction in the initial generational gap in KAP scores.

7.3.1.2 The knowledge assessment on COVID-19 prevention

To evaluate the Digi Nang Talung Beta Version application as an educational tool, an assessment related to a contemporary issue specifically COVID-19 prevention was conducted before and after the intervention. It is important to emphasise that the inclusion of COVID-19 content in this study was not intended as a public health intervention. Rather, it served as an example of how a contemporary social issue can be communicated through a digital platform using a revitalized approach to traditional Nang Talung shadow puppetry. In doing so, the study evaluates the application's educational capacity as a modern adaptation of this traditional art form, while continuing the long-standing practice in which puppeteers integrate current social concerns into their narratives. This approach reflects Nang Talung's historical role as a localized educational and communicative medium.

The results of the assessment are presented in Table 7.5.

	Younger Participants		Older Participants		t-value	Sig.* (P < 0.01)
	Mean	**SD**	**Mean**	**SD**		
Pre-test	1.72	1.674	2.60	2.066	1.282	0.210
Post-test	4.53	1.10	4.00	1.700	1.076	0.291

Table 7.5 Mean Differences in COVID-19 Prevention Scores Between Younger and Older Participants in Model A

Table 7.5 was analyzed using independent-samples t-tests, as the comparisons examine differences between younger and older participants at each time point. A consistent significance threshold of $P < 0.01$ was applied.

The results indicate that there were no statistically significant differences between younger and older participants in COVID-19 prevention knowledge at either pre-test ($t = 1.282$, $p = 0.210$) or post-test ($t = 1.076$, $p = 0.291$). Because these are between-group comparisons, the findings indicate that the two generations did not differ significantly from each other at either measurement point.

Effect size estimates (Cohen's d) for the between-group differences were moderate in magnitude at pre-test (approximately $d \approx 0.57$) and post-test (approximately $d \approx 0.48$). Although these effect sizes suggest some practical difference in mean scores, the differences did not reach the predefined statistical threshold of $P < 0.01$.

Descriptively, both groups showed higher mean scores at post-test (4.53 for younger participants and 4.00 for older participants) compared to pre-test. These results should be

interpreted as indicating **no significant generational difference**, rather than as statistical evidence of improvement.

The Digi Nang Talung Beta Version, when implemented through the Model A workshop, facilitated collaborative interaction between generations. While the mean scores increased descriptively for both groups, the absence of statistically significant between-group differences suggests that younger and older participants demonstrated comparable levels of COVID-19 prevention knowledge after the intervention, reflecting alignment between the two generations within the supported, face-to-face online condition.

7.3.1.3 Learning engagement

Learning engagement was evaluated using the Intrinsic Motivation Inventory (IMI), which measures dimensions such as interest and enjoyment, perceived competence, perceived choice, and pressure or tension (Wilde et al., 2009). Descriptive statistics for the four IMI scales, divided by group, are summarized in Table 7.6.
The means for most groups were relatively similar between older and younger participants. These means can be interpreted using the following scale, adapted from Sullivan and Artino (2013):

- 1.00 to 1.79: Strongly disagree
- 1.80 to 2.59: Somewhat disagree
- 2.60 to 3.39: Neutral
- 3.40 to 4.19: Agree
- 4.20 to 5.00: Strongly agree

Based on this scale:

- Responses for interest and enjoyment were typically between "agree" and "strongly agree" for all groups.
- Perceived competence was generally in the "neutral" range.
- Perceived choices varied between "neutral" and "agree."
- Pressure and tension was most often rated as "disagree" or "neutral."

	Younger Participants		Older Participants		t-value	Sig.* (P < 0.01)
	Mean	**SD**	**Mean**	**SD**		
Interest and Enjoyment	3.97	0.534	4.26	0.422	1.522	0.138
Perceived Competence	3.21	0.799	3.38	1.085	0.497	0.623
Perceived Choice	3.16	0.523	3.82	0.284	3.751	0.001*
Pressure and Tension	2.33	0.384	2.74	0.558	2.434	0.021

Table 7.6 Mean Differences in Learning Engagement Scores Between Younger and Older Participants in Model A

The differences shown in Table 7.6 were analyzed using independent-samples t-tests, as the comparisons examine younger and older participants at the same time point. A consistent significance threshold of **P < 0.01** was applied.

A statistically significant difference was found only for **Perceived Choice** (t = 3.751, p = .001). The estimated effect size (Cohen's d) for this difference is large (approximately d ≈ 1.68), indicating a substantial practical difference between age groups. Older participants (M = 3.82) reported higher perceived choice than younger participants (M = 3.16), suggesting that they experienced a stronger sense of autonomy and flexibility during the Model A workshop.

For Interest and Enjoyment, Perceived Competence, and **Pressure and Tension**, no statistically significant differences were detected at P < 0.01. Although Pressure and Tension approached conventional significance levels (p = .021), it did not meet the predefined threshold. Effect size estimates for these non-significant differences were small to moderate, indicating limited practical separation between generations.

Because these analyses are between-group comparisons, the results indicate generational differences in perceived engagement rather than changes over time. Overall, Table 7.6 suggests that while most aspects of learning engagement were comparable between generations in Model A, perceived autonomy was meaningfully higher among older participants within the supported, face-to-face online condition.

7.3.2 The Digi Nang Talung Beta Version: Model B

In this model, participants also used the same fully online Digi Nang Talung Beta Version. However, they engaged with the application independently on their own devices after completing the orientation session.

While the workshop was conducted at CMU to address logistical limitations (device access, AR Marker printing, and first-time user guidance), gameplay itself was self-directed. Older participants were assigned computers, and some younger participants used personal devices or laboratory computers. After orientation similar to Model A participants played independently.

Unlike Model A, there was no structured collaborative discussion or collective narrative creation during gameplay. Any interaction occurred virtually, consistent with typical online gameplay environments.

Operationally, Model B represents an independent, self-directed online condition, where participants interact individually with the web-based system without structured face-to-face facilitation.

The results of the fully online Digi Nang Talung Beta Version in Model B reflected the outcomes of this independent gameplay workshop as follows.

7.3.2.1 The pre-test and post-test assessment on KAP

The pre-test and post-test assessments of Knowledge, Attitudes, and Practices (KAP) were conducted using self-administered questionnaires. The results, presented in Table 7.7, were analyzed using **independent-samples t-tests**, as the comparisons examine differences between younger and older participants at each time point within Model B. A consistent significance threshold of P < 0.01 was applied.

		Younger Participants		Older Participants		t-value	Sig.* (P < 0.01)
		Mean	SD	Mean	SD		
Pre-test	**Knowledge**	3.67	2.301	6.00	3.232	2.222	0.035
	Attitudes	30.17	0.801	31.10	0.952	2.62	0.019
	Practices	2.67	2.376	4.20	1.033	1.923	0.066
Post-test	**Knowledge**	10.22	1.865	9.50	3.240	0.502	0.620
	Attitudes	31.89	0.493	34.50	0.743	9.96	< 0.01*
	Practices	4.67	1.029	4.20	1.135	1.114	0.275

Table 7.7 The Mean Differences in KAP Scores Between Younger and Older Participants in Model B

At the **pre-test stage**, no statistically significant differences were detected at the predefined threshold of P < 0.01 (all p-values > 0.01). Although older participants had higher mean scores across Knowledge, Attitudes, and Practices, these differences did not meet the stricter significance criterion. Estimated effect sizes for pre-test differences were moderate to large (approximately d ≈ 0.99 for Knowledge and d ≈ 1.17 for Attitudes), suggesting noticeable generational variation prior to the intervention, even though not statistically significant at P < 0.01.

At the **post-test stage**, a statistically significant difference was found only in **Attitudes** (t = 9.96, p < 0.01). The effect size for this difference was extremely large (approximately d ≈ 4.45), indicating a substantial practical difference between younger and older participants. Older participants (M = 34.50) reported markedly higher attitude scores toward Nang Talung than younger participants (M = 31.89).

No statistically significant differences were found at post-test for Knowledge (p = 0.620) and Practices (p = 0.275). Although younger participants showed higher mean scores than older

participants in these two domains after playing, the between-group differences were not statistically significant at P < 0.01, and effect sizes were small to moderate.

7.3.2.2 The knowledge assessment on COVID-19 prevention

Regarding knowledge of the contemporary storyline content, specifically COVID-19 pandemic prevention, the results are presented in Table 7.8. It should be noted that this aspect was not intended as a health intervention; rather, it represents an educational approach to addressing a contemporary issue through a digital platform and a revitalized adaptation of traditional Nang Talung shadow puppetry. In this context, the assessment serves as a proof-of-concept demonstration of the platform's ability to communicate contemporary issues through a traditional art form, rather than functioning as a public health intervention.

The differences shown in Table 7.8 were analyzed using **independent-samples t-tests**, as the comparisons examine younger and older participants at each time point within Model B. A consistent significance threshold of **P < 0.01** was applied.

The results indicate that there were **no statistically significant differences** between younger and older participants at either pre-test (t = 1.833, p = 0.087) or post-test (t = 0.753, p = 0.458). Therefore, at the predefined significance level, the two generations did not differ significantly in COVID-19 prevention knowledge at either measurement point.

Estimated effect sizes (Cohen's d) suggest a moderate between-group difference at pre-test (approximately d ≈ 0.82) and a small-to-moderate difference at post-test (approximately d ≈ 0.34). Although these effect sizes indicate some practical variation particularly at pre-test the differences did not reach statistical significance at P < 0.01.

Descriptively, younger participants' mean scores increased from 3.06 (SD = 1.798) to 4.56 (SD = 1.097), while older participants' mean scores remained stable (4.20 at both pre-test and post-test). These findings should be interpreted as indicating no significant generational difference, rather than as statistical confirmation of improvement.

	Younger Participants		Older Participants		t-value	Sig.* (P < 0.01)
	Mean	SD	Mean	SD		
Pre-test	3.06	1.798	4.20	1.033	1.833	0.087
Post-test	4.56	1.097	4.20	1.398	0.753	0.458

Table 7.8 The Mean Differences in COVID-19 Prevention Scores Between Younger and Older Participants in Model B

7.3.2.3 Learning engagement

Table 7.9 presents the comparison of learning engagement scores between younger and older participants in Model B.

The mean differences were analyzed using **independent-samples t-tests**, as the comparisons examine differences between younger and older participants within Model B. A significance level of **P < 0.01** was applied.

The results indicate that there were **no statistically significant differences** between the two groups in **Interest and Enjoyment** (t = 0.263, p = 0.795), **Perceived Competence** (t = 0.124, p = 0.903), or **Perceived Choice** (t = 1.462, p = 0.156).

Estimated effect sizes (Cohen's d) for these dimensions were small (approximately d ≈ 0.11, 0.05, and 0.61 respectively), suggesting minimal to moderate practical differences that did not reach statistical significance at P < 0.01.

A statistically significant difference was observed only in **Pressure and Tension** (t = 2.982, p = 0.006). The effect size for this difference was large (approximately d ≈ 1.16), indicating a substantial practical difference between groups. Older participants (M = 3.10, SD = 0.544) reported higher levels of pressure and tension than younger participants (M = 2.51, SD = 0.476) in the fully online Model B workshop.

Because these results are based on between-group comparisons at a single time point, the findings indicate that older participants experienced higher levels of pressure and tension than younger participants in Model B. This pattern suggests that the independent online format may have been associated with greater perceived stress among older learners, while younger participants reported comparatively lower tension in the same learning environment.

	Younger Participants		Older Participants		t-value	Sig.* (P < 0.01)
	Mean	SD	Mean	SD		
Interest and Enjoyment	4.30	0.641	4.24	0.440	0.263	0.795
Perceived Competence	3.31	0.963	3.36	1.142	0.124	0.903
Perceived Choice	3.47	0.322	3.30	0.236	1.462	0.156
Pressure and Tension	2.51	0.476	3.10	0.544	2.982	0.006*

Table 7.9 The Mean Differences in Learning Engagement Scores Between Younger and Older Participants in Model B

7.3.3 Usability Test

The usability test of the Digi Nang Talung Beta Version was conducted with participants from both the Model A and Model B workshop processes (see Table 7.10).

	Younger Participants		Older Participants		t-value	Sig.* (P < 0.01)
	Mean	SD	Mean	SD		
Model A	3.46	0.122	3.46	0.930	0.00	1.00
Model B	3.32	0.332	2.99	0.197	3.30	0.003*

Table 7.10 The Mean Differences in Usability Test Scores Between Younger and Older Participants in Model A and Model B

The mean differences were analyzed using **independent-samples t-tests**, as the comparisons examine differences between younger and older participants within each workshop model. A significance level of **P < 0.01** was applied.

In **Model A**, there was **no statistically significant difference** between younger and older participants (t = 0.00, p = 1.00). The mean scores were identical (M = 3.46 for both groups). The estimated effect size (Cohen's d) was approximately 0.00, indicating no practical difference in perceived usability between age groups in the collaborative, face-to-face workshop setting.

In **Model B**, **a statistically significant difference** was found (t = 3.30, p = 0.003). Younger participants (M = 3.32, SD = 0.332) reported higher usability scores than older participants (M = 2.99, SD = 0.197). The estimated effect size was large (Cohen's d ≈ 1.21), indicating a substantial practical difference between the two groups in the fully online, independent condition.

Because these results reflect between-group comparisons at a single time point within each model, they indicate generational differences in perceived usability rather than changes over time. The absence of differences in Model A suggests comparable usability perceptions when participants engaged collaboratively. In contrast, the significant and practically large difference in Model B suggests that younger participants perceived the platform as more usable than older participants when interacting independently online.

This pattern may reflect differences in digital familiarity and confidence. The findings highlight the importance of designing age-inclusive digital interfaces and considering additional guidance or interface adjustments to support older users in independent online learning environments.

7.3.4 Observation

Data was also collected through observations during the workshop process for the Digi Nang Talung Beta Version to assess participant engagement, interest, and interactions.

In the Model A workshop, which was designed for small groups of younger and older participants to play the online application together, interactions were more frequent. In contrast,

the Model B workshop was designed for participants to play online independently, which may have resulted in lower levels of interaction due to the virtual format. Participants were less engaged with each other and with co-creation activities, a trend observed in other virtual educational contexts (Yilmaz, 2023; Baber, 2022). While some interactions may have occurred without being observed, the majority of findings come from the observations in the Model A workshop process.

Key Observations:

1. Intergenerational Interaction
   Social interaction between generations can help bridge generational gaps (Sánchez and Kaplan, 2014) by facilitating the exchange of information (Reboul, 2017) and cultural knowledge (Abdulla, 2016; Tamuli and Mishra, 2023). In Model A, most participants engaged across generational lines through cooperative play, question-asking, and discussions. Both younger and older participants contributed equally by asking and answering questions, fostering a dynamic exchange of ideas.

2. Learning Engagement: Enjoyment and Focused Attention
   Observations revealed differences in how younger and older participants expressed learning engagement. Younger participants outwardly expressed enjoyment through laughter and self-competitive behavior during games. In contrast, older participants were more quietly attentive, focusing on completing tasks or acquiring new skills. However, during post-activity discussions, older participants expressed their enjoyment verbally, suggesting their engagement was equally meaningful but less outwardly demonstrative.

   These findings align with research suggesting that younger individuals may express enjoyment as "fun," while older individuals experience it more as "joy" (Kawabata and Mallett, 2022). However, there were exceptions in both age groups, indicating individual differences in behavior.

3. Co-Creation in Story Design
   Model A encouraged collaborative storytelling between generations. Participants controlled virtual puppets and collectively advanced storylines and solved challenges. This co-creation process (Ramaswamy and Ozcan, 2018) utilized shared resources like puppets and digital tools, fostering interaction and creativity in an open, exploratory environment (Hou and Shi, 2021).

These observations highlight the potential of Digital Nang Talung as an educational and intergenerational tool, while also identifying areas for improvement, particularly in its online application, where face-to-face collaboration is missing.

7.4 Chapter Summary

Chapter 7 presents the findings of Study III, which examines how the Digital Nang Talung Beta Version (accessible at https://digitalung.itch.io/digi-nang-talung) can bridge the generational gap

through intergenerational learning and engagement. Both models were fully online in technological terms. However, Model A introduced structured, face-to-face collaborative facilitation, while Model B required independent, self-directed engagement. This distinction enabled analysis of how social configuration influences learning, usability, and engagement outcomes.

Pre-test and Post-test Assessment on KAP:
The pre-test and post-test assessments on Knowledge, Attitudes, and Practices (KAP) revealed notable differences between younger and older participants before using the application.

In **Model A**, the initial KAP gap between generations was reduced after the workshop. Both groups demonstrated significant improvements in post-test scores. The structured face-to-face collaboration appeared to facilitate intergenerational knowledge exchange, directly addressing RQ4: **How can Digital Nang Talung bridge the generational gap and address real-world needs as a form of folk media?**

In **Model B**, although attitudes differed significantly older participants expressing more favorable attitudes toward Nang Talung no significant differences were observed in knowledge or practices. Younger participants showed higher post-test scores in these areas, suggesting independent online engagement may benefit digitally fluent users more strongly.

Knowledge Assessment on COVID-19 Prevention:
Both models assessed participants' knowledge on COVID-19 prevention. In Model A, the collaborative nature of the workshop led to improved knowledge, attitudes, and practices, with no significant generational differences in post-test scores. This outcome indicates that the intergenerational exchange of knowledge helped narrow the KAP gap. In Model B, although there were no significant changes in knowledge, younger participants showed a notable increase in their scores, suggesting that the digital platform reinforced existing knowledge, particularly for younger participants.

Taken together, these results indicate the promising potential of the Digital Nang Talung online application as an educational and communicative platform. By combining traditional narrative structures with interactive digital elements, the system demonstrates its capacity to support knowledge engagement and intergenerational learning in contemporary contexts.

Learning Engagement:
The learning engagement (Tables 7.6 and 7.9) was compared using independent-samples t-tests.

In **Model A**, a statistically significant generational difference was found only in **Perceived Choice** ($P < 0.01$), with older participants reporting higher autonomy. The effect size was large, indicating a meaningful practical difference. No statistically significant differences were observed in Interest and Enjoyment, Perceived Competence, or Pressure and Tension. These findings indicate that while most engagement dimensions were comparable, older participants reported greater perceived autonomy within the collaborative setting.

In **Model B**, no statistically significant generational differences were observed in Interest and Enjoyment, Perceived Competence, or Perceived Choice (P > 0.01). However, a statistically significant difference was found in **Pressure and Tension** (P < 0.01), with older participants reporting higher levels than younger participants. The effect size was large, indicating a substantial practical difference. These findings suggest that the independent online format was associated with higher perceived stress among older participants, while engagement levels in other dimensions remained similar across generations.

Usability Test:
The usability (Table 7.10) was also analyzed using independent-samples t-tests.

In **Model A**, no statistically significant difference was found between younger and older participants (P = 1.00), and the effect size was negligible. This indicates comparable usability perceptions in the collaborative workshop format.

In **Model B**, a statistically significant generational difference was observed (P < 0.01), with younger participants reporting higher usability scores than older participants. The effect size was large, indicating a practically meaningful difference. Because this comparison was conducted at a single time point, the result indicates a generational disparity in perceived usability under independent online conditions.

Conclusion:
The findings of Study III demonstrate that the Digital Nang Talung Beta Version has strong potential as a tool for supporting intergenerational learning and narrowing generational differences. Both Model A and Model B were fully online in technological terms; however, they differed in their social facilitation structure. Model A incorporated structured, collaborative facilitation, while Model B relied on independent, self-directed participation.

The results consistently indicate that **Model A (structured intergenerational collaboration)** was more effective in reducing generational differences. Model A was associated with reduced gaps in Knowledge, Attitudes, and Practices (KAP), comparable usability ratings between age groups, and largely similar engagement levels. Although some specific differences emerged (e.g., perceived choice), these did not reflect broad disparities between generations. This suggests that guided collaboration supported balanced participation and mutual knowledge exchange.

In contrast, **Model B (independent online participation)** revealed clearer generational differences. Significant between-group differences were found in post-test attitudes, pressure and tension, and usability, often with large effect sizes. Older participants reported higher pressure and tension and lower usability scores, while younger participants generally reported more favorable independent digital interaction. These findings suggest that social facilitation plays an important role in moderating age-related differences in online learning environments.

However, the interpretation of these results as **"generation gap"** effects should be considered in light of several limitations. **First**, the study employed purposive sampling based on stakeholder involvement in the development process; therefore, the findings may not be fully generalisable to the broader population across age groups. **Second**, variables such as participants' prior technology literacy and digital skills were not directly measured or controlled. As a result, some observed differences attributed to age may instead reflect differences in digital familiarity rather than generational characteristics per se. **Third**, the requirement to print and use an AR marker may have limited flexibility and influenced participants' interaction with the system, potentially affecting usability and engagement outcomes.

Taken together, the findings suggest that the Digital Nang Talung platform can contribute to bridging generational divides, particularly when implemented within a structured, socially facilitated environment. At the same time, future research should incorporate broader sampling strategies, measure digital literacy explicitly, and refine the AR interaction design to better isolate and understand the mechanisms underlying generational differences in digital heritage learning.

Chapter 8 : Discussion

8.1 Introduction

This chapter discusses the development process of the Digital Nang Talung project, which is based on the intangible cultural heritage of Nang Talung and Digital Arts. It focuses on the participation and co-creation workshops that utilized various tools to introduce an innovative, fully online application of Digital Nang Talung. This approach included an interactive process to evaluate and test its efficiency, particularly in bridging the generational gap. The ultimate goal is to ensure the sustainability of this intangible cultural heritage and its adaptability to the modern technological world.

The study followed four key steps. It began with an exploration of the current state of Nang Talung from the youth's perspective. This was followed by data collection, which served as the baseline for the proposed model. A draft of the digital design was created by incorporating suggestions and feedback from both the younger and expert puppeteers. The objective was to develop a suitable model that preserves the traditional charm and core elements of Nang Talung. Conclusions and suggestions from participants were carefully considered in the development of a hybrid digital version of Nang Talung.

The step-by-step process in this mixed-method study included both action research and surveys. Through interventions such as workshops and focus groups, the study successfully developed a fully online version of Nang Talung.

The Digital Nang Talung applications were tested to address the research questions posed in this study.

8.2 Discussion

8.2.1 Pilot Study

The first step, a pilot study, investigated how younger Thai individuals perceive Nang Talung as a performance art and explored ways to promote youth access and interest. The study collected quantitative data through a survey of Digital Media students at Prince of Songkla University International College (n = 135) as a younger group and conducted an in-depth interview with an expert puppeteer (EP), an experienced Nang Talung performer.

Findings revealed that while younger participants exhibited high engagement with technology in their daily lives, they had limited exposure to and knowledge of Nang Talung. This lack of familiarity reflects a broader trend of declining interest in traditional performance arts as younger generations gravitate toward technologically mediated forms of entertainment such as social media (Nilvanich & Wisuttipat, 2017). The generational gap in cultural engagement is not unique to Nang Talung but extends to other Thai folk performances, including classical dance and regional shadow play genres (Pradana & Srisontisuk, 2023; Soongphankhao, Kuntawong &

Khutchan, 2017; Akkapram, 2020). This raises significant concerns about preserving Thailand's intangible cultural heritage, which, as a "living heritage," cannot be replaced if lost (Lenzerini, 2011). However, preservation efforts must also allow for modernization to ensure continued relevance (Jacobs, 2016). This delicate balance between tradition and innovation was a central theme of the study.

The findings further indicated that the low interest among youth was not due to a rejection of Nang Talung but rather its inaccessibility. Participants enjoyed viewing shadow play online but faced barriers to experiencing live performances, including the rarity of shows, a lack of publicity, traditional performance settings, and the use of Southern Thai dialects. Additionally, expert puppeteers highlighted that rising costs, driven by demand for celebrity performers, further limited access. These accessibility challenges are not unique to Nang Talung; similar issues have been observed in Javanese Wayang Kulit, which becomes less accessible as rural communities disperse, and in Northern Thailand's shadow play traditions (Pradana & Srisontisuk, 2023; Brereton & Yenchuey, 2007). While preservation efforts have been undertaken to sustain Nang Talung and other traditional arts (Nilvanich & Wisuttipat, 2017), these initiatives often lack sufficient resources and fail to address the critical issue of accessibility, particularly for younger, urbanized audiences (Akkapram, 2020). Furthermore, preservation programs often emphasize maintaining live performance environments, which may inadvertently alienate younger audiences, even when content is updated. This underscores the urgent need for strategies to make Nang Talung more accessible.

Digitization was identified as a potential solution for enhancing access to and interest in Nang Talung. Both younger participants and expert puppeteers supported the idea of digitization but expressed concerns about maintaining the art form's cultural integrity. For expert puppeteers, the modernization of Nang Talung must retain its storytelling essence, moral teachings, and artistic elements such as music. The study emphasized that Nang Talung's identity as a storytelling art (Lim, 2013) is central to its value as intangible cultural heritage and should be preserved in any adaptation. Successful examples from other traditions illustrate how modern technologies such as animations and interactive tools can effectively present traditional stories while respecting cultural authenticity (Hendriana, Aziz & Junaidi, 2016; Hsiao, 2019; Hsiao & Wang, 2020). However, cautionary examples, such as the video game Wayang Fighters, which uses the visual elements of Wayang Kulit while disregarding its traditional stories and themes, highlight the risks of reducing cultural heritage to mere aesthetics (Ghani, 2015).

The study's findings suggest that revitalizing interest in Nang Talung requires the thoughtful integration of modern digital tools with its traditional storytelling and artistic practices. Accessibility must be prioritized, not only through digitization but also through strategies that address the linguistic and logistical barriers limiting engagement with live performances. Balancing modernization with preservation is critical to ensuring Nang Talung remains vibrant and relevant while retaining its cultural essence. This approach offers a promising path forward for safeguarding Thailand's intangible cultural heritage in a rapidly changing world.

8.2.2 Study I: Participatory Design and Co-Creation for Digital Nang Talung

This study applied the findings from the pilot study to a participatory design process to address the RQ2: How can participatory design and co-creation be used to create a model and implementation plan for Digital Nang Talung? Using insights from the pilot study, academic literature, information on Nang Talung traditions, and interaction design principles, five proposed models and character concept designs were drafted. Data collection involved focus groups, in-depth interviews, and a participatory design workshop. These methods explored participants' views on Digital Nang Talung, evaluated the five proposed design models, and engaged younger and expert puppeteers in co-creating characters and scenes. The findings served as inspiration for the initial digitized Nang Talung application. The study was conducted at Prince of Songkla University (PSU) with 21 university students as the younger group (YG) and two expert puppeteers (EP).

During the focus group discussions, participants rejected three of the five proposed models, which combined digital tools like projectors and computers with traditional Nang Talung settings and puppeteers. These models were deemed inaccessible due to their reliance on uncommon technologies like projectors. Traditional interaction design approaches might have overlooked these limitations, as they often focus on developers' assumptions about user needs rather than direct input from stakeholders (Bødker et al., 2022).

While these models could be effective in educational contexts, such as schools or museums (Kang & Yang, 2020; Robin & McNeil, 2019; Rizvic et al., 2019; Aditama & Setiawan, 2020; Boboc et al., 2022), their limited accessibility made them unsuitable for the project's goals.

Another significant finding was the strong preference for interactivity, particularly among younger participants. They favored game models with multi-player functionality over static designs. This feedback resulted in the creation of a new interaction model, combining the equipment-light design of one model with the multi-player capabilities of another. This preference aligns with research showing that younger audiences enjoy interactive and socially engaging games (Kawabata & Mallett, 2022). Moreover, interactivity and social engagement are also important for older users, as they promote mental well-being and foster community connection (Siebler, 2016). Consequently, the final development process prioritized multi-player and interactive designs to appeal to both age groups.

The participatory design workshop successfully facilitated co-creation between younger and expert puppeteers. While its primary aim was not to finalize character designs, it provided a structured environment for stakeholder collaboration, enabling participants to share ideas and cultural knowledge (Bødker et al., 2022). This exchange of ideas encouraged social interaction and helped bridge generational gaps through the mutual sharing of cultural insights (Abdulla, 2016; Tamuli & Mishra, 2023).

Co-creation, an intellectual exchange requiring appropriate structures and tools (Ramaswamy & Ozcan, 2018), was effectively supported by the workshop framework. Participants engaged in a communication process involving the sending, receiving, interpreting, and responding to cultural

insights (Berlo, 1960; Reboul, 2017). This engagement not only contributed to the development of characters and scenes but also fostered social cohesion and a deeper understanding of Nang Talung traditions. The workshop outputs provided valuable insights for the first version of Digital Nang Talung and successfully engaged stakeholder groups in the design process.

This study demonstrated that participatory design and co-creation are effective approaches for developing Digital Nang Talung. By integrating feedback from diverse stakeholders, the study addressed critical issues related to accessibility, interactivity, and generational engagement. The iterative design process, informed by both theoretical insights and practical input, ensured that the final product was both culturally respectful and broadly accessible. These outcomes highlight the value of participatory design in preserving intangible cultural heritage while making it relevant to contemporary audiences.

8.2.3 Study II: Interactive Design and Testing of Digital Nang Talung

After finalizing the concept for the first version of Digital Nang Talung based on insights from previous studies, the design and development process commenced. The primary aim was to address RQ3: How can tools such as 2D animation, augmented reality (AR markers), game design, and interaction design be employed to create a novel form of Digital Nang Talung that enhances users' knowledge, attitudes, and practices (KAP)?

This study, conducted at Prince of Songkla University (PSU), involved a sample of 20 university students (Younger Group, YG) and two expert puppeteers (EP). The development process incorporated various components, including character design, scene setups, animation, motion graphics, music, game elements, and the integration of AR marker version 1.0.

The Digital Nang Talung Alpha Version was conceptualized as a hybrid theater platform consisting of two modes: Story Mode and Freestyle Mode. This platform enabled interactive, site-specific theater experiences that reimagined traditional Nang Talung performances in a digital format.

The findings addressed RQ3, demonstrating that the Digital Nang Talung Alpha Version effectively merged traditional and digital elements to create an engaging and educational experience. A statistical analysis revealed a significant improvement in participants' KAP scores after engaging with the application ($p < 0.01$).

Despite its success, several areas for enhancement were identified:

- 2D Animation
  The use of 2D animation proved to be an effective storytelling tool for Digital Nang Talung. This approach aligned with the stylized, narrative-focused nature of traditional Nang Talung and its historical roots as a form of projected 2D animation. Furthermore, 2D animation's ability to prioritize story over visual detail made it suitable for engaging users, particularly younger audiences, while maintaining the essence of shadow play traditions (Ahmad et al., 2020; Pradana & Srisontisuk, 2023). Feedback from focus

groups and workshops affirmed its utility, though some participants noted that the game mechanics were more engaging for younger users than for older ones. Overall, the effectiveness of 2D animation in facilitating cultural storytelling was strongly supported.

- Augmented Reality (AR) Markers
  The implementation of AR markers allowed for interactive, location-specific content, supported by literature on AR's role in enhancing engagement and learning (Boonbrahm et al., 2020). AR enabled users to interact with physical spaces while accessing learning materials and narrative content. However, marker-based AR's reliance on specific locations limited its usability. This limitation prompted reevaluation in subsequent development stages, with adjustments made to improve accessibility in future versions.

- Game Design
  The game design for Digital Nang Talung adopted principles of serious games, combining entertainment with educational objectives (De Freitas, 2018). Designed as an adventure game, it allowed users to follow a point-of-view character through interactive settings, encountering traditional Nang Talung characters and learning about its history and themes. Balancing engagement and learning was critical, and feedback indicated that the game successfully sparked interest and maintained participant involvement. While the included challenges were deemed somewhat easy, they provided a foundation for further refinement. Participants proposed incorporating additional puppets, modern themes, and storylines to enhance engagement while preserving the art form's core cultural essence. The positive reception validated the use of formal game design principles, emphasizing shadow play's suitability as a medium for gamification (Chen et al., 2019; Hsiao, 2019).

In conclusion, the Digital Nang Talung Alpha Version stands as a testament to the potential of digital tools in reimagining Nang Talung as a hybrid theater platform. By integrating Story Mode and Freestyle Mode, the project demonstrated significant improvements in participants' KAP. These findings validate the effectiveness of the approach and provide qualitative feedback to guide further refinement in future studies.

8.2.4 Study III: Bridging the Generation Gap with Digital Nang Talung

The final phase of this study focused on refining the beta version of Digital Nang Talung and evaluating its potential to bridge the generational gap while addressing real-world needs as a form of folk media. This stage built on insights from previous studies, particularly the qualitative feedback from participants.

Suggestions and opinions from both younger participants and expert puppeteers were incorporated into the development process. The user-driven character design approach introduced more fantastical elements into character customization, enhancing creativity and engagement.

The scene designs depicted typical rural settings, maintaining alignment with the traditional context of the storyline. In this fully online version, three modes were developed: Nang Talung Theatre Mode, Freestyle Mode (featuring two mini-games), and Story Mode.

Participants requested the need for a clear orientation, an introduction, and structured instructions on Nang Talung content. Accessibility was highlighted as critical, particularly regarding detailed guidance on interacting with the content through AR Marker Version 2.0. These requests were especially prevalent among older participants (OG).

To test the Digital Nang Talung Beta Version as a fully online application, two workshop models were developed:

- **Model A:** Small group interactions were younger (YG) and older (OG) participants engaged face-to-face in a group setting.
- **Model B:** A fully independent online experience where each participant interacted individually using their own devices.

The assessments focused on key areas such as KAP learning engagement, usability testing, and qualitative data collection through observations.

Bridging the Generational Gap through Learning Engagement and Usability in Digital Nang Talung

Digital Nang Talung functions as more than a technological artefact it is a **medium for cultural expression**. The use of AR markers, designed to reflect the physical characteristics and movement patterns of traditional Nang Talung puppets, allows users to manipulate digital characters in ways that **mirror authentic puppeteering techniques**. This physical engagement creates an embodied learning experience that connects users with the performative and narrative essence of Nang Talung.

Story content, such as Nam Jai Mae (The Kindness of Mother and Daughter), reinforces traditional values of respect, honesty, and family virtue. Alongside these narrative-based experiences, the system also includes freestyle interactive modes—such as Dodge COVID Ball and Fight the Giant—which introduce contemporary themes in a playful format. These modes draw on the long-standing tradition in Nang Talung performances in which puppeteers incorporate current social issues into their storytelling. In the digital environment, these interactive scenarios help make the experience more engaging and relatable for younger users while maintaining the cultural logic of traditional shadow play.

By blending moral storytelling with interactive and contemporary scenarios, the artefact demonstrates how Digital Nang Talung can remain culturally grounded while adapting to modern modes of engagement, thereby positioning the platform as a bridge between traditional heritage and contemporary digital learning.

Study III demonstrates that **learning engagement and usability are key to bridging the generational gap** in Nang Talung knowledge, attitudes, and practices (KAP). Pre- and post-test results revealed significant improvements across all age groups, with older participants achieving post-test scores comparable to younger participants, thereby narrowing the gap. Social and collaborative learning (Model A) proved more effective than independent online interaction (Model B), highlighting that **shared learning experiences enhance cultural transmission**. Engagement patterns varied across generations: younger participants expressed enjoyment openly, while older participants showed focused, deliberate attention. Older users, however, experienced more tension and usability challenges, particularly in the online mode, reflecting differences in digital familiarity and leisure-based technology use (Calvo-Porral & Pesqueira-Sanchez, 2019).

These findings suggest that **bridging the generational gap requires an artefact that is both engaging and intuitively usable**, supporting active participation from users of all ages. Digital Nang Talung achieves this by turning KAP assessment into a form of **embodied learning**, where participants not only acquire knowledge but also perform it through physical manipulation of AR Markers in a culturally meaningful context. By combining usability, playful learning engagement, and authentic cultural expression, the artefact fosters intergenerational participation and supports the sustainable transmission of Nang Talung heritage.

Implications for the Future
Study III demonstrated that Digital Nang Talung successfully bridges generational gaps in KAP and broadens access to intangible cultural heritage. Its adaptability as an online tool ensures relevance in a changing world, while its role as folk media underscores its capacity to communicate critical cultural information.

However, integration of social media platforms like TikTok which was intentionally excluded from the scope of this study. The focus was on creating a participatory and culturally grounded application rather than a one-way, short-form content approach typical of platforms like TikTok. However, it is acknowledged that TikTok and similar platforms especially given their popularity among younger generations since gaining international traction around 2017 present potential for cultural preservation and outreach. Exploring such tools may offer additional value and would be a worthwhile direction for future research aiming to extend the impact of Digital Nang Talung and other intangible cultural heritage in the digital age

Ultimately, Digital Nang Talung has proven to be a valuable innovation, preserving and revitalizing Nang Talung while demonstrating how traditional cultural forms can evolve and thrive in the digital age. This study provides a strong foundation for further exploration of its applications in education, cultural preservation, and public communication.

8.3 Chapter Summary

This chapter discusses the findings from the pilot survey study as a baseline for the three studies which conducted to explore the development and impact of Digital Nang Talung as a tool for preserving and enhancing the traditional art of Nang Talung. The studies employed

participatory design, interactive design, and generational engagement strategies to examine how digital tools, such as 2D animation, augmented reality (AR), game design, and interaction design, could contribute to the modernization of Nang Talung while preserving its cultural heritage.

Study I focused on participatory design and co-creation processes involving both youth and expert puppeteers. It demonstrated that by incorporating stakeholder input, including feedback on accessibility and interactivity, Digital Nang Talung could be tailored to ensure both educational value and cultural relevance. The study also highlighted the importance of creating engaging and interactive models that appeal to both younger and older generations, emphasizing the role of co-creation in preserving the traditional knowledge of Nang Talung while introducing new design elements.

Study II advanced the project with the creation of the Digital Nang Talung Alpha Version. It demonstrated that combining traditional elements with innovative digital tools, such as 2D animation and AR markers, could create an engaging and educational platform. The study confirmed the effectiveness of the approach by showing significant improvements in participants' knowledge, attitudes, and practices (KAP). However, it also revealed areas for improvement, such as enhancing accessibility and refining the game mechanics to appeal to all age groups.

Study III focused on refining the Beta Version and tested its potential to bridge generational gaps in knowledge, attitudes, and practices. The findings suggested that Digital Nang Talung successfully addressed generational differences, with significant improvements in KAP scores across all age groups. The study also raised the broader issue of declining engagement with Nang Talung across generations, particularly among older participants. While the platform's ability to bridge the generation gap was confirmed, the study emphasized the importance of usability and engagement, particularly for older users, to ensure broader accessibility and inclusivity.

Overall, this research study highlights the importance of participatory design, interactive technologies, and cross-generational engagement in the development of Digital Nang Talung. The iterative design process, informed by user feedback, helped address critical issues such as accessibility, interactivity, and usability. The findings demonstrate the potential of digital tools to preserve intangible cultural heritage while making it accessible and relevant to contemporary audiences. The study's outcomes underline the value of digital innovations in the cultural and educational sectors, particularly in the context of traditional art forms like Nang Talung.

Chapter 9 : Conclusion and Recommendations

9.1 Introduction

This chapter concludes the research by synthesizing the key findings and emphasizing their significance in the broader context of preserving intangible cultural heritage (ICH). It highlights the study's contributions to academic knowledge, cultural preservation practices, and the field of digital arts. The chapter also reflects on the limitations encountered during the research process, which provide valuable insights for refining future studies. Finally, it outlines practical and theoretical recommendations for leveraging digital tools to safeguard and modernize traditional art forms like Nang Talung, ensuring their relevance in contemporary society.

9.2 Conclusion

This study focused on intangible cultural heritage (ICH), specifically examining Nang Talung, a form of folk media originating from southern Thailand. Using findings from a pilot study as a baseline, supported by a comprehensive literature review, the research identified a notable decline in the preservation and practice of Nang Talung ICH.

The decline can be attributed to rapid changes in modern lifestyles, technological advancements, and shifting audience preferences, with increasing reliance on mass media over traditional art forms.

Nang Talung, as an example of intangible cultural heritage, holds deep cultural significance. It embodies community pride, reflecting values such as morality, integrity, and respect for individual rights. Additionally, it serves as a form of entertainment with a simple yet meaningful style that has endured through history. However, these cultural values face challenges in maintaining their relevance amid societal and technological transformations.

The decline of Nang Talung is not only due to limited accessibility among youth and adults of various ages but also the difficulty in finding successors to carry on the tradition as puppeteers. Puppeteers are vital to Nang Talung, as they breathe life and intellect into the puppets. Traditionally, puppeteers—who are predominantly male—infuse the performances with charm and humor, making the art form captivating and engaging.

The knowledge and skills of puppeteers are implicit, passed down from generation to generation, often within families. In the past, this transmission of expertise was considered almost hereditary, like a "bloodline." However, this is no longer the case in the present day. Although some efforts have been made to establish community clubs to support Nang Talung, these initiatives have not been efficient enough to ensure its sustainability as a form of folk media.

Meanwhile, many research studies have focused on folk media, often exploring its application in education and health communication. Some studies aim to preserve the art of folk media, while

others focus on its adaptation for modern uses. Despite these efforts, the challenge of sustaining Nang Talung as a living tradition remains significant.

From the previous analysis and data, several key elements emerge as critical to the preservation and revitalization of Nang Talung. First and foremost is its role as a cornerstone of community culture, reflecting deeply held beliefs, norms, and values. Nang Talung serves not only as entertainment but also as a vessel of cultural identity and pride, preserving the moral and ethical foundations that bind communities together.

At the heart of Nang Talung lies the implicit knowledge held by the individuals who contribute to its traditional creation—especially the puppeteers. These artisans are the lifeblood of the art form, infusing it with its essence and charm. Through their creativity and skill, Nang Talung transcends its simple materials to become a medium that educates, entertains, and connects audiences across generations.

However, Nang Talung is not immune to the pressures of modernity. Like many forms of folk media, it faces the risk of decline in the face of shifting lifestyles, technological advancements, and a lack of successors to carry on the tradition. While efforts such as community clubs have been established to sustain Nang Talung, they have yet to achieve the level of efficiency required to secure its future.

If Nang Talung is to survive and thrive in the modern world, it must be revitalized and adapted to contemporary contexts, including integration with modern technology. Without such efforts, this treasured art form risks being lost, along with the cultural heritage and shared values it represents. The challenge lies not only in preserving the tradition but also in ensuring it remains relevant and accessible to future generations.

Digital Arts, as a fusion of science and art, holds significant potential for revitalizing traditional folk media like Nang Talung. By incorporating participatory and co-creation processes, Digital Arts enable the sharing of knowledge, experiences, preferences, and skills among individuals who engage as stakeholders. These collaborative methods foster a deeper connection between traditional art forms and modern audiences, allowing for both preservation and innovation.

Furthermore, the tools employed in Digital Arts—such as animation, gameplay, augmented reality (AR), and others—can recreate or reimagine Nang Talung in ways that resonate with contemporary preferences. These technologies not only breathe new life into the art form but also ensure its accessibility and adaptability in a rapidly changing cultural landscape.

The concepts outlined above are supported by the theoretical framework presented in Figure 2.1, which serves as a foundation for this study. Alongside this framework, the research objectives, questions, and methodologies are illustrated in Figure 3.6, providing a comprehensive roadmap for exploring how Digital Arts can contribute to the preservation and modernization of Nang Talung.

This study utilized a mixed-method approach combined with a series of development steps to create an online digital Nang Talung application. The process involved designing scenes, characters, storylines, and gameplay modes supported by modern technologies, all aimed at achieving the study's objectives. The resulting applications are accessible online at https://digitalung.itch.io/nang-talung-book and https://digitalung.itch.io/digi-nang-talung Evaluation and testing were conducted to assess their effectiveness.

The study also incorporated workshops and co-creation processes, with data collected through both qualitative and quantitative methods. Self-administered questionnaires were used for qualitative surveys, while observations, in-depth interviews, and focus group discussions provided quantitative data. Feedback, including opinions, comments, and suggestions, was meticulously considered and integrated at each stage of development, as demonstrated in Studies I, II, and III. This iterative approach ensured continuous improvement and refinement of the digital Nang Talung application.

The key outcomes and results in relation to the research objectives and questions are summarized as follows:

1. The development and design of customized scenes, characters, AR marker versions 1.0 and 2.0, two mini-games in Freestyle Mode, Story Mode, and Nang Talung Theatre Mode were successfully completed. Two applications were developed for Digital Nang Talung: the Digital Nang Talung Alpha Version and the Digi Nang Talung Beta Version. These applications were posted on the websites mentioned earlier, along with two video clips available on YouTube: https://www.youtube.com/watch?v=_KO7Ib0ciHU and https://www.youtube.com/watch?v=XeaAVwIdSO8

2. The assessments and evaluations addressing the research questions were as follows:
    2.1. The Digital Nang Talung Alpha Version, a site-specific theatre platform for multiplayer, two-way communication, significantly enhanced participants' knowledge, attitudes, and practices (skills) at $P < 0.01$, as addressed in RQ3.
    2.2. The Digi Nang Talung Beta Version, a fully online application, was tested in small groups (Model A). Before playing, a statistically significant difference was observed between the younger group (YG) and the older group (OG) regarding their Knowledge, Attitudes, and Practices (KAP) related to Nang Talung ($P < 0.01$), as shown in Table 7.4. After playing, no statistically significant difference was found between the younger group (YG) and the older group (OG), with the mean scores converging, as illustrated in the graph in Figure 9.1.
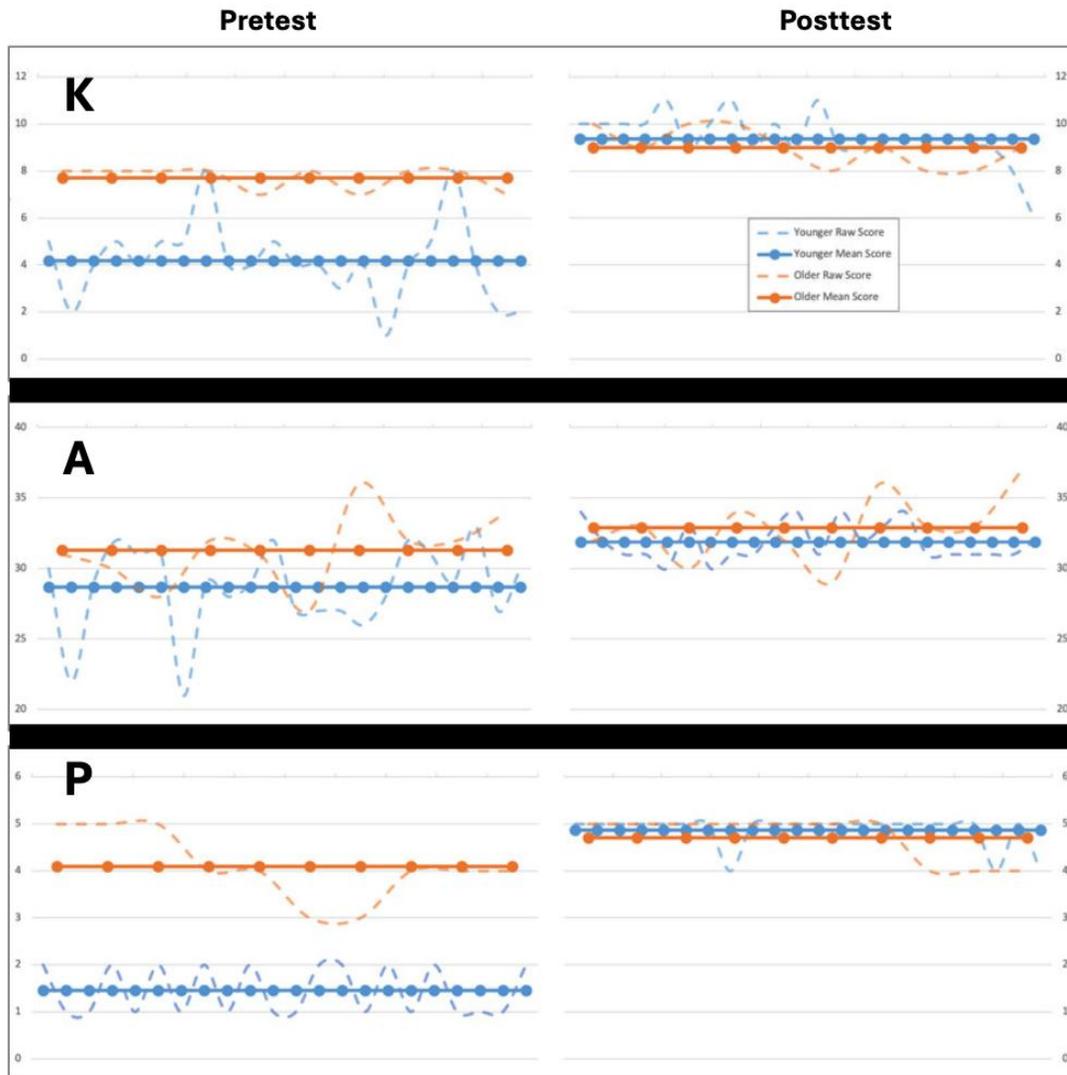
Figure 9.1 KAP mean scores before and after playing the Digi Nang Talung Beta Version

However, when assessed in a fully independent online experience, participants from both the younger group (YG) and older group (OG) played on their own devices (Model B). The only statistically significant difference observed was in the attitude between the younger group (YG) and the older group (OG) after playing the application (P < 0.01). This suggests that older participants may have experienced more pressure and tension in the learning environment created by the Digi Nang Talung Beta Version compared to younger participants. This finding highlights potential challenges for older individuals in fully online, independent learning settings and emphasizes the importance of designing inclusive environments that minimize stress for all age groups. Among older participants, the pressure and tension were significantly higher in the Model B workshop.

These results indicate that playing online as a group (with face-to-face interaction) was more effective in bridging generational differences than the independent online format. These findings challenge the need for inclusive digital learning environments that account for generational

differences, particularly in terms of digital literacy, to ensure that Digital Nang Talung is suitable for all age groups.

This study is an initial investigation into Digital Nang Talung, employing a multi-step approach that incorporates participatory and co-creation processes along with digital arts tools. The development of the Digital Nang Talung application shows promising results, indicating its potential to promote and revitalize Nang Talung, ensuring its sustainability in modern society. However, further research is needed to build on these strategies. Future studies should consider working as a collaborative team of researchers, including specialists in humanities, history, and programming, who are interested in creating and developing this new form of folk art for contemporary society. This approach will help preserve Nang Talung as a valuable folk media that reflects both the cultural roots and evolution of the country.

9.3 Research Limitation

The limitations of this study are as follows:

1. **Generalizability to the Population:** Since this study focused on a development process based on stakeholders' experiences, knowledge, and preferences, the sampling technique used was purposive sampling. As a result, the findings may not be fully generalizable to the entire population across all age groups.
2. **Influence of Other Variables:** The study did not account for other variables, such as participants' technology literacy and skills, which may have influenced the dependent variables. These factors were not considered in the study and could have impacted the results.
3. **Augmented Reality (AR) Marker Limitations:** The use of an AR marker required users to print it, which limited the flexibility and independence of interacting with the online application. Further research should focus on developing a more advanced AR marker or exploring other tools that can be manipulated to better resemble the original traditional stick puppets.

9.4 Research Implication

This research aims to contribute to the preservation of intangible cultural heritage (ICH) in alignment with both Thailand's and UNESCO's cultural preservation policies. ICH refers to the practices, expressions, knowledge, skills, and the associated tools, objects, and cultural spaces that communities and groups recognize as part of their cultural identity (UNESCO, Convention for the Safeguarding of the Intangible Cultural Heritage, Article 2). This study developed a novel Digital Nang Talung application designed to retain the essence and charm of traditional Nang Talung. Its potential to support the preservation and sustainability of ICH in Thailand appears promising.

The following implications for both practical and academic future work are recommended:

1. Continuous Improvement of Digital Nang Talung Tools
   The development of Digital Nang Talung, as documented in this study, revealed strong potential for preserving intangible cultural heritage (ICH) in a format that engages younger audiences. However, feedback highlighted areas that require refinement, such as character interaction and AR marker responsiveness. This underscores the need for continuous development and iterative testing. Future work should focus on enhancing interactivity, expanding narratives, and ensuring cultural authenticity—ideally through co-creation and participatory design methods.

2. ICH Preservation a challenge for all relevant sectors
   ICH preservation should be integrated across sectors including education, healthcare, digital media, and public policy. For example, incorporating Digital Nang Talung into school curricula or public health programs could foster deeper cultural engagement and encourage creative learning in various contexts.

3. Expanding the Sample to Include Broader Demographics
   While this study primarily involved youth participants, the observed value of intergenerational interaction particularly between older and younger university students was a key strength. Including participants from a wider age range in future studies would offer richer insights and more diverse perspectives. This broader inclusion could improve usability across different demographics and help preserve shared cultural memory between generations.

4. Beyond Generational Gaps: Technology Literacy and Accessibility
   Although bridging the generational gap was a core aim of this study, the findings also revealed challenges related to technology literacy. Future research should explore these barriers across all age groups. Factors such as internet access, device compatibility, and user-friendly interface design must be considered to ensure that the Digital Nang Talung experience is inclusive and accessible to everyone.

5. Government Funding as a Catalyst for Growth and Sustainability
   This study represents a prototype with early signs of success and participant engagement. With appropriate government funding and institutional support, the project could evolve into a national initiative for ICH preservation through digital innovation. Funding would enable further technological development, support integration with cultural policy, and allow for broader dissemination through platforms such as schools, museums, cultural centers, and public outreach campaigns.

9.5 Chapter Summary

Chapter 9 provides a comprehensive conclusion to the research study on the development and impact of Digital Nang Talung as a tool for preserving and revitalizing the traditional art form of Nang Talung. The chapter reflects on the key findings, the research contributions, and the limitations, while also offering recommendations for future research and practical applications.

The study's findings emphasize the potential of Digital Nang Talung in bridging generational gaps and preserving intangible cultural heritage (ICH). Through a combination of participatory design and digital arts tools such as animation, augmented reality (AR), and game design, the project successfully created an engaging online application. This application helps promote the traditional art of Nang Talung, ensuring its relevance in the modern world.

Despite promising results, the research highlights several limitations, including the challenges of generalizing the findings due to the use of purposive sampling, the exclusion of certain variables like technology literacy, and the constraints of the AR marker technology. These limitations underscore the need for further development and more inclusive studies that consider factors like accessibility and generational differences in digital literacy.

The chapter also discusses the implications of the research for both practical and academic purposes. It recommends the continued development of tools for Digital Nang Talung, calls for greater involvement from various sectors to preserve other forms of ICH, and suggests expanding future studies to include more diverse age groups and a focus on technology literacy. Additionally, it advocates for government policies that support the preservation of ICH through funding and assessment.

In conclusion, this research provides valuable insights into the role of digital technologies in cultural preservation and offers a foundation for future studies and initiatives aimed at sustaining traditional art forms in the digital age. It is hoped that this study can be expanded or adapted through gameplay, allowing traditional puppeteers to co-create and perform with general users in virtual environments. However, further research and development are needed to refine this concept and ensure its cultural and educational value is preserved.

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Appendix A: Study Instruments

Appendix A.1 Pilot Study Questionnaires

Item/Question	Item Type	Choices
Gender	Categorical	Male Female Other/Prefer not to say
Age	Categorical	18 19 20 21 22
What is your occupation?	Categorical	Full-time student Part-time student (not working) Part-time student (working)
Where do you live?	Categorical	In the city Outside the city
Which of these devices do you own or can access?	Categorical	Smartphone Internet Desktop/Laptop Tablet Projector
How much time do you spend using… a day? • Smartphone • Internet • Desktop/laptop • Tablet • Projector	Categorical	Not used 1-2 hours 2-4 hours 4-8 hours 8+ hours
Which of these forms of media are you interested in? (Pick as many as you like)	Categorical	Thai music Thai drama American music American drama Korean music Korean drama Japanese music

		Japanese drama
Have you ever seen a shadow play?	Categorical	Yes No Not sure
If yes, how many times a year?	Open-ended	
Where do you watch shadow play?	Categorical	Television Internet Theatre Temple fair Somewhere else
What do you view as the main charm of shadow play?	Categorical	Night-time performance Performance technique Fun stories Generational transfer of knowledge Use of Southern language
If you don't like shadow play, why not?	Open-ended	
Should shadow play be digitized?	Categorical	Yes No
What are the pros of digitizing shadow play?	Open-ended	
What are the cons of shadow play?	Open-ended	
What suggestions do you have for digitizing shadow play?	Open-ended	

Appendix A.2 Study II Knowledge, Attitude and Practice (KAP) Questionnaires

Item/Question	Item Type	Choices
Section 1: Participant Information		
Gender	Categorical	Male Female Other/Prefer not to say
Age	Categorical	18 19 20 21 22
Which of these devices do you own or can access?	Categorical	Computer Projector Internet Image shadow Mobile audio device Smartphone Marker sign and webcam
Have you ever seen a Nang Talung performance?	Categorical	Yes No Not sure
If yes, when did you see it?	Open-ended	
If yes, where did you see it?	Open-ended	
Section 2: Knowledge		
1. Shadow plays similar to Nang Talung are found in which countries? 2. What is Nang Talung? 3. What is the composition of Nang Talung shadow play? 4. Which leather puppet represents the great teacher? 5. What is the impact of Nang Talung on society?	4-Multiple choices	

1. Please identify the character Teng. 2. Please identify the character Nu Nui. 3. Please identify the character Si Kao. 4. Please identify the character Yod Tong. 5. Please identify the character Khwan Muang. 6. Please identify the character Samor.	4-Multiple choices	
Section 3: Attitudes		
1. Nang Talung is a contemporary entertainment media. 2. Nang Talung is a traditional art that should be preserved. 3. There are only some people who are interested in Nang Talung. 4. Nang Talung is challenging to understand. 5. Most people enjoy Nang Talung. 6. Ability to play Nang Talung is a source of pride. 7. I wish to preserve Nang Talung. 8. Nang Talung should be developed to suit the new generation. 9. You must learn and practice to be able to play Nang Talung. 10. It is difficult to find Nang Talung in public.	5-point Likert Scale	1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree
Section 4: Skills in Practice		
1. Movement control of the joker walking shadow. 2. Movement control of angry shadow. 3. Movement control of slaps. 4. Movement control of crying shadow. 5. Movement control of laughing shadow.		1 = Correct 0 = Incorrect
Section 5: Content Satisfaction		
1. Content and images are consistent. 2. Text is consistent 3. Classification is easy to understand.	5-point Likert Scale	1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree

4. Sorting of content in steps is easy to understand. 5. The amount of content is sufficient. 6. Information and images on the website are good. 7. It is clear, accurate, and reliable.		5 = Strongly agree
Section 6: Website Format Satisfaction		
1. Accuracy in design of posture and movement of the characters 2. Appropriate use of characters. 3. Interestingly designed characters. 4. Good display speed for images and characters. 5. Font size and style is attractive and easy to read. 6. Background colour and font colour is suitable. 7. Design colours are appropriate. 8. Beautiful, modern, interesting. 9. Formatting on the website is easy to read and use.	5-point Likert Scale	1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree
Section 7: Content Satisfaction		
1. Creating a digital shadow game lets young people understand Nang Talung better. 2. Game content makes you want to conserve the art form. 3. Game content makes the value of shadow play clear. 4. Game content allows you to learn how to control shadow puppets. 5. Content helps you know about Nang Talung. 6. I like Scene 1: Prelude. 7. I like Scene 2: Classroom at the Temporary Cabin. 8. I like Scene 3: Adventure in the Deep Forest. 9. I like Scene 4: Crossroads: Choice between life and death	5-point Likert Scale	1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree

Section 8: Benefits and Usage Satisfaction		
1. Content is useful to users and can be applied. 2. It is a good media to make shadow play easier to access. 3. It is a source of knowledge. 4. It is a source of information that meets the needs of users.	5-point Likert Scale	1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree
Do you have any other recommendations for Digital Nang Talung to improve design or content?		

Appendix A.3 Study III Knowledge, Attitude and Practice (KAP) Questionnaires

Item/Question	Item Type	Choices
Section 1: Participant Information		
Gender	Categorical	Male Female Other/Prefer not to say
Age	Categorical	19 20 21 22 23 24 25
Department	Categorical	Animation and Visual Effects Modern Management and Information Technology Digital Game
Have you ever seen a Nang Talung Performance?	Categorical	Yes No
If so, when?	Open-ended	
If so, where?	Open-ended	
Do you have… at home? • The internet • A computer • A projector	Categorical	Yes No
How much time do you spend on the Internet each week?	Categorical	<10 hours 10-20 hours 21-50 hours 51-100 hours >100 hours
How much time do you spend on a computer each week?		<10 hours 10-20 hours 21-50 hours 51-100 hours >100 hours

How long do you spend using a projector per week?	Categorical	<10 hours 10-20 hours 21-50 hours 51-100 hours >100 hours
Section 2: Knowledge		
1. Shadow plays similar to Nang Talung are found in which countries? 2. What is Nang Talung? 3. What is the composition of Nang Talung shadow play? 4. Which leather puppet represents the great teacher? 5. What is the impact of Nang Talung on society?	4-Multiple-choices	
1. Please identify the character Teng. 2. Please identify the character Nu Nui. 3. Please identify the character Si Kao. 4. Please identify the character Yod Tong. 5. Please identify the character Khwan Muang. 6. Please identify the character Samor.	4-Multiple-choices	
Section 3 Attitudes		

1. Nang Talung is a contemporary entertainment media. 2. Nang Talung is a traditional art that should be preserved. 3. There are only some people who are interested in Nang Talung. 4. Nang Talung is challenging to understand. 5. Most people enjoy Nang Talung. 6. Ability to play Nang Talung is a source of pride. 7. I wish to preserve Nang Talung. 8. Nang Talung should be developed to suit the new generation. 9. You must learn and practice to be able to play Nang Talung. 10. It is difficult to find Nang Talung in public.	5-point Likert scale	1 = Strongly disagree 2 = Somewhat disagree 3 = Neutral 4 = Somewhat agree 5 = Strongly agree
Section 4: Skills in Practice		
1. Movement control of the joker walking shadow. 2. Movement control of angry shadow. 3. Movement control of slaps. 4. Movement control of crying shadow. 5. Movement control of laughing shadow.		1 = Correct 0 = Incorrect
Section 5: Reducing Risk of COVID-19 Infection		
1. What is the right way to clean your hands to protect you from the COVID-19 virus? 2. How far is far enough for social distancing? 3. What areas should you avoid touching? 4. When should you see medical care?	4-Multiple choices	

5. What should you do when going into a public area?		

Appendix A.4 Usability Questionnaires

Question	Item Type	Choices
1. I would like to play Digital Nang Talung every day. 2. I found Digital Nang Talung made me confused. 3. I thought Digital Nang Talung was easy to use. 4. I would need the researcher to help me use Digital Nang Talung. 5. I found the instructions easy to follow. 6. I thought there were too many errors in the Digital Nang Talung system. 7. I think most of my friends would learn to use Digital Nang Talung very quickly. 8. I found Digital Nang Talung difficult to use. 9. I felt very confident using Digital Nang Talung. 10. I needed to learn a lot of things before I could get going with Digital Nang Talung.	5-point Likert scale	1 = Strongly disagree 2 = Somewhat disagree 3 = Neutral 4 = Somewhat agree 5 = Strongly agree

Appendix A.5 Learning Engagement Questionnaires

Question	Item Type	Choices
Interest and Enjoyment		
1. While I was playing Digital Nang Talung I was thinking about how much I enjoyed it. 2. I would describe Digital Nang Talung as very enjoyable. 3. Doing Digital Nang Talung was fun. 4. I thought playing Digital Nang Talung was very interesting. 5. I thought Digital Nang Talung was very boring.	5-point Likert scale	1 = Strongly disagree 2 = Somewhat disagree 3 = Neutral 4 = Somewhat agree 5 = Strongly agree
Perceived Competence		
1. I think I am pretty good at playing Digital Nang Talung. 2. I think I did pretty well at Digital Nang Talung compared to others. 3. I am satisfied with my performance at Digital Nng Talung. 4. I feel pretty skilled at the game. 5. After working at Digital Nang Talung for a while, I felt pretty competent.	5-point Likert scale	1 = Strongly disagree 2 = Somewhat disagree 3 = Neutral 4 = Somewhat agree 5 = Strongly agree
Perceived Choice		
1. I put a lot of effort into this. 2. I didn't try very hard to do well at this activity. 3. I tried very hard on this activity. 4. It was important to me to do well at this activity. 5. I didn't put much energy into this.	5-point Likert scale	1 = Strongly disagree 2 = Somewhat disagree 3 = Neutral 4 = Somewhat agree 5 = Strongly agree
Pressure and Tension		

1. I did not feel at all nervous about playing this game. 2. I felt tense while playing Digital Nang Talung. 3. I felt relaxed while playing Digital Nang Talung. 4. I was anxious while playing Digital Nang Talung. 5. I felt pressured while playing Digital Nang Talung.	5-point Likert scale	1 = Strongly disagree 2 = Somewhat disagree 3 = Neutral 4 = Somewhat agree 5 = Strongly agree

Appendix B: A Development Model for Education About Nang Talung

In the Expert Interviews of Phase I, the puppeteers (experts) suggested an extensive amount of content that could be communicated through Digital Nang Talung about the art and its performance. Here, a long-form summary and integration of the suggested content is provided. This was used to guide development of the digitization process for Nang Talung.

Part 1: There should be an educational component which is tailored for youth audiences. This would explain the background of Nang Talung and why it became so popular. This would also explain the key components of classic Nang Talung performances, and the key elements that must be preserved in any modern adaptations using new communication technology. This is especially true for broadcasts in the southern region.

Part 2: The content should reflect the role of folk media that helps develop good habits for youth. But the content must be presented in a way that attracts interest. For example, the drama "Nam Jai Mae" could be adapted for a Nang Talung presentation using traditional characters as the actors.

Part 1: An educational program on the history and background of Nang Talung

Historical and essential content on Nang Talung
1. History and background of Nang Talung
2. Origin of Nang Talung in Thailand
3. Models of Nang Talung, past and present
4. Nang Talung forms
5. Nang Talung performance
6. Role of Nang Talung in society

The following are details of each topic area, as proposed by the key informant puppeteers.

1) History and background of Nang Talung

Based on the available data, Nang Talung is age-old and widespread throughout parts of Southeast Asia. The art form has clear influences from India, and each location where it has taken root has adapted the format somewhat to conform to the local culture. On the other hand, there is a group of scholars who believe that the versions of Nang Talung in each country actually arose independently of each other. Nang Talung in SE Asia can be classified into the following types: (1) Large form (Thai); Nang Sbek (Khmer). The rubber 'puppets' are large-scale and the puppets' arms are attached to the torso and cannot be moved independently; (2) In this form, the puppets are smaller-scale and the arms of the puppet can be moved freely. This latter form is more popular than the former, and includes Nang Yong (Khmer), Wayan Kulit (Malay), Wayang Yawor (Javanese), and Nang Talung (Thai).

In Thailand, Nang Talung is an indigenous art form, primarily for southern Thai communities. The language is the same for narration and dialogue. Verses take the form of common poetry. Originally, the Nang Talung plays took themes/tales from the Ramakian epic. Later, other sources were used, such as the Buddhist Chataka (fables), Kraitong, Sangtong, Chaichet, Keo Na Ma, etc. The puppets are designed by first drawing the image on a piece of animal hide (cattle, buffalo, deer, etc.). The hide is first soaked in water and then further reduced in thickness until it is translucent. It is then stretched until tough, like a canvas. The various characters are then sketched on the hide canvas. Once complete, the images are cut out and decorated with color and designs. Supports are attached to maintain the shape and manipulate the movements of the puppets. The comic relief characters need not conform to a strict design. However, the images of the Phra (holy man) and heroine need to adhere to the classic design elements.

2) Origin of Nang Talung in Thailand

It is not clear where/when/how Nang Talung arose in Thai communities. There could have been some connection with the spread of Brahmanism and Hindu deity/Shiva worship. There is a clear history of Nang Talung in Nakorn Si Tammarat, Pattalung, and Surat Thani Provinces. The following are some theories of its origins there:
- Nang Talung originated in Pattalung at Khao Ya Hong, or Khao Phraya Hong in Tambon Charat, Muang District.
- Nang Talung was influenced by the 'Nang Yai' version used in Ayuthaya Province. This is indicated by the large size of the puppets.
- It is an off-shoot of the Javanese and Malay Ta Nang Tong versions. Nai Kong Chang who lived in the Nakorn Si Tammarat area imported the art form to Thailand.
- Early Thai Nang Talung was influenced by the Javanese shadow puppetry and Nang Yai, which merged into the Thai Nang Talung.

3) Models of Nang Talung, past and present

Historically, the puppeteers would adhere to the classic design of Nang Talung but change the method of performance and the content somewhat. This changed with each era. In the first era, Nang Talung used a light source from burning animal oil. In subsequent eras, a kerosene lamp was used. Currently an electric light bulb is used to create the shadow. The accompanying music has multiple instruments: Pii, Tap, Mong, Ching, and Klong Tuk. The puppeteer plays two parts: one is a holy man and the other is the heroine. Another performer plays the part of the comic.

In the past, Nang Talung was purely for recreational purposes. At present, Nang Talung has evolved somewhat to keep up with the times and preferences of society. Still, the structure remains faithful to the classic model. There has been the addition of musical instruments such as the Saw Duang, Klong Chut, and other pieces. The colors and sounds are also enhanced for dramatic or comic effect. The dialogue has become more prose than verse. Also, the puppets have been enlarged, and the troupe of players has doubled from 5 or 6 persons to 9 to 15.

4) Nang Talung forms

It is believed that, originally, Nang Talung was performed by puppets which the audience could see directly. Later, shadow puppetry was used by having the characters back-lit, separated from the audience by a white screen. The patterns painted on the puppets reflected local designs, and the lighting enhanced the color effect to make it quite beautiful. To carve the puppets out of hide requires knowledge, concentration, imagination, and manual dexterity. The carving of the puppets is consistent with the customs, beliefs, religion, and dress patterns of the local people.

A typical Nang Talung troupe will have about 150-200 puppets. But every troupe must have the following characters: A hermit, Shiva, Prai Na Bote, Chao Muang, heroine, ogre, comical characters, and gods. In addition to these, there may be puppets of animals, trees, etc. The comical characters must include Nai Nuy, Nai Theng, Nai Si Keo, Nai Yotong, Nai Samaw, and Nai Khwan Muang. Ancillary characters include Nai In Keo, Ni Tho, Nai Tik, Nai Phun, Nai Prap, Nai Kong Rot, Nai Jiin Jang, Nai Nu Neuay, and Nai Krang, among others. Each of the comical characters have their own distinctive appearance and clothing.

5) Performing Nang Talung

The core components of Nang Talung consist of the troupe of performers and assistants, musical instruments, the stage, stage equipment, and puppet figures. The troupe normally comprises 8 to 9 people. Prior to the reign of King Rama VI, the narrators were called 'puppeteers,' and there were usually two of these. They told the story and sang the verses. Some troupes had only one puppeteer, and that is the case at present. However, the total number in the troupe has remained fairly constant due to the increase number of musicians. The performance of Nang Talung is similar to a play or musical. There are songs, negotiations, and mannerisms that go along with the verses. Popular songs include the Mukto, using eight-verse or market verse as a foundation.

The equipment for Nang Talung include a light source which was a lantern in the past, which used animal or coconut oil as fuel. At present, a 500-watt light bulb is used which is suspended about a meter from the projection screen.

Typically, a troupe will have from 150 to 200 puppets. These puppets are arranged in a careful order in terms of their importance and frequency of use. Some troupes arrange their puppets by category (e.g., ogre, holy man, hermit, etc.). The more sacred images are always placed on top of the pile.

Equipment to amplify the voices has evolved as the technology has advanced. Banana tree stalks are used to frame the stage. There may be a chorus whose role is to sing verses. The screen is made of thin white material, and this is stretched across the stage in such a way that the audience cannot see what is behind it. Lights are used to create attractive reflections around the screen. In the past, the musical instruments were basic, including a Mong, Tap, Klong Tuk, Ching, Pii, etc. Over time, there was addition of modern instruments such as an electronic key board, guitar, etc. The stage is a modular structure which can be disassembled and reassembled. There are four posts to create the frame. In the past, performances were staged in the grounds of Buddhist monasteries, and performed in conjunction with ordinations, cremations, etc. The important steps in performing Nang Talung include receipt of the Khan

Mak, Kan Berk Rong, Kan Mo Rong, Kan Ok Rupe Kru, narration of the tale, creation of the setting, acting the parts, Kan Chum Chat, and Bok Lerk. A typical performance can extend for as long as 7 to 8 hours.

6) **Role of Nang Talung in society**
- **As entertainment:** The Nang Talung stories can be captivating and absorbing, especially at night when all you can see is the stage and puppets. The stories are familiar tales so the audience can follow the action. The narration and dialogue are in the local dialect. The charm comes from the different personality and appearance of the various characters, as well as the sung verse and music from instruments.
- **As a form of communication:** The tales can include updates of news and special events in real life. The humor is combined with current events.
- **Transmission of the traditional lore:** Nang Talung is one way to pass on the traditions and lore from one generation to the next. The stories also explain lifestyles and cultural practices, which the youth can learn from. This helps promote solidarity and proper behavior in a community. The stories are also a source of pride and value in one's heritage and society.
- **Conservation and dissemination of the indigenous cultural arts:** Nang Talung is a part of the cultural heritage of the society and the nation. This needs to be preserved and disseminated.

Part 2: Content that reflects local media roles in cultivating good habits for youth: The story of "Nam Jai Mae" (The kindness of Mother and Daughter)

The puppeteer presents Nam Jai Mae as a fantasy story which can be applied to reinforce values, respect for elders, and honesty. It is also an enjoyable story in its own right. The following is a summary of the story:

Characters
1) **Phraew Ta:** A blind woman who lives in a forest hut
2) **Manee:** The elder child of Phraew Ta, and who is responsible for providing for the family
3) **Manat:** A younger child who takes care of Phraew Ta and spends all the time at home
4) **Yak-Hatsadate:** Green Yak (Green Monster)

Storyline
Phraew Ta is the mother of Manee and Manat. She is blind, and they live in a hut deep in the forest. Manee is the provider of the family while Manat is the caregiver for their mother. One day, Manee goes to buy medicine for Phraew Ta. On the way, Manee comes across a beautiful pond, and decides to go swimming. Suddenly, a Green Yak appears by the pond, and is angry that Manee is trespassing on his pond. Manee begs for forgiveness, but the ogre does not grant it. Manee explains that he was only going to buy medicine for his ailing mother out of a sense of filial piety. Manee says if the Green Yak lets him get the medicine, then Manee will return to the pond to be eaten bv the Green Yak. The Green Yak is impressed and calls upon a magical spirit to provide medicine for Manee's mother. Manee is delighted and rushes home to give his

mother the medicine. After she is cured, Manee honors the promise he made. Manee returns to the pond to be eaten by the Green Yak.

Appendix C: A Digital Nang Talung Scenes and Script – "The Kindness of Mother and Daughter"

Scene 1: Prelude	
	Open the scene with the song: "The Bat Eats the Banana."
	Teng and Nu Nui talk about the mother (Aunt Praewta) and her daughter (Manee) who are performing Nang Talung in the back.
Teng:	"You know, Nu Nui, Aunt Praewta is part of a Nang Talung troupe, and has been performing here for a long time. Years ago, her husband was the No. 1 Nang Talung puppet master of Pattalung Province. But he died a long time ago, when Manee was still very young."
Nu Nui:	"But now, Manee is a skilful Nang Talung puppeteer."
Teng:	"Yes, and she is just as good as her father was."
Nu Nui:	"Where did she learn the art of Nang Talung?"
Teng:	"From her mother! What did you think? But alas, Aunt Praewta is not so healthy these days; her hearing is diminishing; her vision is dimming. I heard that Manee is going to go into the forest to try to find some traditional medicine for her mother. Tomorrow, Aunt Praewta is going to teach Manee how to hunt for the medicine that will help treat her mother's vision problem. Manee will also learn about traditional healing at the same time."
Nu Nui:	"How does the training work?"
Teng:	"I don't know myself."
Nu Nui:	"Well then, I think I'll join Manee tomorrow to see how it works."
Teng:	"That's a good idea.Maybe I'll join you.You are showing good respect for your elders."
Nu Nui:	"Let's watch the rest of the Nang Talung. Afterwards we can talk with Aunt ."
Teng:	"OK."

Scene 2: Classroom at the temporary cabin	
	Play the song:"Bat eats banana"
	Nu Nui and Teng go to visit Aunt Praewta at her home
Aunt Praewta	"Where are you two gents going?"

Teng:	"We heard you were going to teach Manee and the Nang Talung troupe how to identify medicines in the forest. We thought we'd join the adventure."
Aunt Praewta	"It could be dangerous. Before you get to the mountain which has the medicine, you have to pass through four challenges. Aren't you afraid?"
Nu Nui:	"Not at all. Let's go.We can help each other. And Manee is a dutiful daughter, and we want to help her succeed in her quest. Then, her Aunt Praewta will be able to continue as a Nang Talung puppet master for many more years to come."
Aunt Praewta	"Thanks for your compassion and goodwill. Let's get ready. Manee, are you ready?"
Play the song: "The bat eats the banana":	
While they walk into the forest, Aunt Praewta explains the origin of Nang Talung. It is a form of shadow play. Originally, the light source came from a torch, or a lantern fueled by beef oil. Later, hurricane lanterns were used. When electrical generators were available, they used those to power the light source. Nowadays, they use electric light bulbs to create the shadows. Later, the stages were decorated with beautiful panels on the top, bottom, left and right of the stage. The puppets spoke only using the unamplified voice of the puppeteer.	
Aunt Praewta	"In Nang Talung, besides the protagonist and the goddess, there are a lot of fun characters, and as many as six in a given play.I'll tell you more as we walk along."
	(***Teng*** *is from Ban Ku Kute Village in Tignphra District, Pattalung Province. He is tall and lanky, and has a wide mouth, white eyes, and dark skin. He likes to wear a checkered sarong. He is playful and likes to tease others. He speaks slowly but not clearly.*)
	(***Nu Nui*** *is from a market town in Muang District of Songkhla Province. He is stocky and huge booty big fat belly. His skin is dark, and he carries a pair of scissors as a weapon. He likes to wear a sarong used by the older generation. He is easily persuaded by others, and tends to follow what his peers are doing. He is a bit slow, and can't really assert himself. He does not speak clearly.*)
	(***Sikeo*** *is a resident of Tambon CherngSae in Ranote District of Songkhla Province. He is short and chubby, with a bald head. He has rather dark skin and a long nose. He likes to wear traditional Thai male pants with a loin cloth draped across his bare shoulders. He does not wear a shirt. He is brave, honest, and moral.*)

	(Yot Tong *is from Chom Thong Mountain in Ron Pibun District of Nakorn Si Tammarat Province. He has a large paunch, and a protruding rear end. He has a curled nose, frizzy hair, and dark skin. He likes to wear the traditional Thai male pants with a dagger as a weapon. He likes to exaggerate, and brag about his prowess with women. He speaks in a loud voice and will interrupt others out of eagerness to speak with them.)*
	(Khwan Muangis a Buddhist. He is thin and rather short. He has a large paunch, and buttocks. He has a prominent nose, wide mouth, and dark skin. He is easily frightened, but tends to seek the pity or sympathy of others. He appears rather anxious for no reason. He is Arrogant.)*
	(Samor *is from Sakom Village in Jana District of Songkhla Province. He is tall and mostly thin, except for an arched back with protruding belly. He likes to wear a sarong and a hat typical of South Asians. He is a traditionalist who likes to scold others for not conforming to tradition. Uncompromising. That said, he likes to tease his friends, and is misogynistic. His accent resembles Thai Muslim speakers.)*

Aunt Praewta has explained the background and history of Nang Talung, as well as the typical characters (puppets) that appear in performances. Aunt Praewta also teaches them about exploring for useful things in the forest, and the adventures that can be had when confronting and surmounting the 4 challenges.	
Aunt Praewta	"Come here…let's go for a walk in the forest. It can be dangerous. We need to pass through four challenges that can be intimidating."
Manee:	"Like what are these fearsome challenges?" (*Manee asks*.)
Teng+ Nu Nui:	"Yeah, Aunt Praewta, please tell us more."
Aunt Praewta	"Ok.Listen carefully.The 4 challenges we will meet are as follows": (design each of the challenges)

Challenge 1: Wonder Treasure Cave*(The user must first answer a set of questions about Nang Talung. If any answer is incorrect, the user's avatar will fall into a ravine. Then they will have to work their way back to the mouth of the cave. To pass into the cave, the user must answer all questions correctly.)*
Challenge 2: Gang of Harassing Monkeys: (*The next challenge questions concern attitudes toward the preservation of the Nang Talung art form. If any of the user's answers reflect a negative attitude toward Nang Talung, then they will be mobbed by the gang of monkeys. The user will then have to start again from the point they were before.)*
Challenge 3: Camouflage Pool:(*The user must manipulate the puppet over/around the pool.If not done carefully, the puppet avatar will fall into the pool. The user will then be returned to where they were before.)*

Challenge 4: Green Ogre: *(This challenge requires the user to fight the man-eating ogre. If the user loses, s/he will be eaten by the ogre. If the user wins, s/he will pass through the cave to collect the medicinal herbs.)*	

Scene 3: Adventure in the deep forest	
	Play the song: "The bat eats the banana"
	Aunt Praewta, Manee, Teng, and Nu Nui cautiously enter the forest while searching for the traditional herbs to make the medicine to treat Aunt Praewta's vision problem.
Teng:	"This appears to be the mouth of the cave…but there is a sign asking something….
Aunt Praewta	"OK…now we have to help each other answer the question…I'm glad I was just able to tell you about Nang Talung."
	Teng and Nu Nui eagerly answer the challenge questions. (*The questions should be in multiple choice answer format. Show an example of how each puppet avatar would be penalized for answering incorrectly, and the reward they receive if answering correctly.*)
	Entering **Challenge 1: Wonder Treasure Cave:** (*If the user answers the question incorrectly, their avatar falls into a ravine and they have to return to the mouth of the cave. All questions must be answered correctly to pass this challenge.*)

Question	**Item 1.** **Which country/countries also has an art form similar to Thailand's Nang Talung?** A. India B. China C. Malaysia D. All three **Item2.** **What is Nang Talung?** A.It is pig skin, marinated in salt and pepper and fried in oil at 250 degrees B.It is the name of a kind of play which uses puppets which are manipulated to act out parts in a small theater. Each puppet is dressed in a unique style and colors. Music accompanies the story of the play. C.It is a traditional art form of the Shan ethnic group. It is usually performed at night time. The participants stand in a circle, hold hands, and sing a song in triple time. D. It is the name for a form of entertainment which uses images that are carved out of an animal hide. The puppets have sticks attached to parts of their body so that the puppeteer can manipulate their movements. The puppets are behind a white screen that is back-lit to project their image on the front of the screen. The music that accompanies the shadow play is produced by the Thai flute, drums, and gong. **Item3.** **What are the components of Nang Talung?** A. Script of the Nang Talung play B. Nang Talung puppets C. Nang Talung theater D. All of the above
	Item4. **Which Nang Talung puppet portrays a teacher?** A. Hermit B. Teng C. Cow D. Nu Nui **Item5.** **What role does Nang Talung play in society?** A. It is a traditional art form that provides entertainment B. It is a medium to educate and share news that is relevant to the lifestyle of persons in the locality C. It is a tool to share traditional wisdom and spread the arts and cultural of the local region. In this way, it is part of the socio-cultural heritage of the country

	D. All of the above
Question	**How do you feel about Nang Talung?** 1. It is an old media form that is obsolete; it is not appropriate for today's youth ( ) Agree ( ) Disagree 2. It is a traditional art form that must be preserved ( ) Agree ( ) Disagree 3. I'm not interested; let it disappear with time ( ) Agree ( ) Disagree 4. It is hard to understand; I don't want to study it ( ) Agree ( ) Disagree 5. It is entertaining and fun; it teaches us a moral ( ) Agree ( ) Disagree 6. It's impressive how they move the puppets ( ) Agree ( ) Disagree 7. I would like to help preserve and spread Nang Talung ( ) Agree ( ) Disagree

	8. Nang Talung needs to be adapted so that it is more entertaining for today's youth ( ) Agree ( ) Disagree
	9. It is difficult to perform Nang Talung; it will probably go extinct ( ) Agree ( ) Disagree
	10. Nang Talung is not as interesting as the new media and entertainment ( ) Agree ( ) Disagree
	Challenge3: Camouflage Pool:(*The user has to manipulate the puppet-avatar across or around the pool. If it falls in, then the puppet-avatar is returned to the entrance to the pool.*)
	Define the various puppets for Nang Talung and design a method of manipulation by standing at the edge of the pool. The user selects the characteristic that matches the defined character. **Item 1.** The god/goddess **Item 2.** The comical characters (design multiple characters to be manipulated)
Scene 4: Magic swamp	
	Play the song: "The bat eats the banana"
	(After passing the various challenges and adventures, everyone began to feel beleaguered. Manee was helping her mother to get up and continue, but she fell down again. Teng and Nu Nui came over to help.)
Manee:	"Ok then…why don't we sit here and rest a bit. There is a cool breeze and there is fresh water nearby."
Teng+ NuNui:	"Sounds good….but may I suggest that Manee and Aunt *Praewta* wait here. I will take Nu Nui to go look for some wild fruit for us to eat."(*Both go into the forest to look for wild fruit*)
	Play the song: "The bat eats the banana"
	(All of a sudden, Teng and Nu Nui hear a loud, scary sound. They run back to the others in a panic.)
NuNui:	"Hurry, hurry, let's get out of here."
Teng:	"The Green Ogre is chasing us; Hurry up Aunt Praewta and Manee"
Manee**:**	Mom, try to get up.(*Aunt Praewta struggles to stand up, but can only move slowly*)
Ogre:	"Who dares to play in my magic swamp? let's fight!"
	Players must manipulate the puppet to move according to the gestures that the giant ordered to do. In which players will use the

	shadow puppet moves that were previously learned to practice the manipulation with the AR controller.
	After Manee fight the giants until they win. But the giant would still eat Manee and her mother anyway. However, Manee tries to stop ogre, and pleads for the Ogre take her and not her mother. Seeing this willingness of Manee, the Ogre feels compassion for both mother and daughter, and their love for each other. Accordingly, the Ogre has a change of heart and announces to one and all that he will no longer harm living things who come into the forest. Instead he will become a guardian of the forest. The Ogre then asks Aunt Praewta and Manee to perform Nang Talung that they started to do before. The Ogre says that this traditional art form is part of the global cultural heritage, and must be preserved. The Ogre bestows a puppet in his shape and color, so that Aunt Praewta and Manee can include the Ogre in the cast of characters of Nang Talung, as someone who sends the message of mother-daughter love and devotion for the audience to emulate.

Appendix D: Character Design

Appendix D1: Participants' Character Sketch Designs

	Teng	Nu Nui	Sikeo	Yot Tong	Khwan Muang	Samor
1						
2						
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Appendix D2: A Digital Nang Talung Character Design

Character image	Style	A character image designed animation	The postures manipulation and personalities that apply to the story
	Preawta, is a mother of Manee. After childbirth, blindness, rarely strong, a good person never hurt anyone and have a knowledge about Nang Talung shadow play.		She is not movement as the shadow puppetry, but depends on the content of the story. Applied by her style
	Manee, be a daughter of Preawta, a teenager active girl who loves mom and likes to help people.		She is not movement as the shadow puppetry, but depends on the content of the story. Applied by her style
	Green Ogre, the giant green, height and large body with a fangs , scary eyes, dangerous, like eating people and animals.		He is not movement as the shadow puppetry, but depends on the content of the story. Applied by his style
	Teng is from Ban Ku Kute Village in Tignphra District, Pattalung Province. He is tall and lanky, and has a wide mouth, white eyes, and dark skin. He likes to wear a checkered sarong. He is playful and likes to tease others. He speaks slowly but not clearly.		movement control of joker shadow: fast walking, do not talk to each other, follow the rhythm of the music when hurry. He will say a little heavy voice. If any scene has 2-3 images, he will go in the middle and raise his hands to express his opinions. If it is a favourite story, he will loading laugh.
Character image	Style	A character image designed animation	The postures manipulation and personalities that apply to the story

	Nu Nui is from a market town in Muang District of Songkhla Province. He is stocky and huge booty big fat belly. His skin is dark, and he carries a pair of scissors as a weapon. He likes to wear a sarong used by the older generation. He is easily persuaded by others, and tends to follow what his peers are doing. He is a bit slow, and can't really assert himself. He does not speak clearly.		Walking slowly without performing music, using stroke over the stick and then swing the arm. Nodding during speaking, his voice in the throat, nasal sound, when he is speaking he have to raise his hand to conform to the language spoken.
	Sikeo is a resident of Tambon CherngSae in Ranote District of Songkhla Province. He is short and chubby, with a bald head. He has rather dark skin and a long nose. He likes to wear traditional Thai male pants with a loin cloth draped across his bare shoulders. He does not wear a shirt. He is brave, honest, and moral.		movement control of laughing Shadow: touch at one corner of the mouth, slightly leaned down, voiceovers laughing with shaking the head when laughed. His lips stick together and wide, when he is talking his face turned to the right and to the left and thumbs up.
	Yot Tong is from Chom Thong Mountain in Ron Pibun District of Nakorn Si Tammarat Province. He has a large paunch, and a protruding rear end. He has a curled nose, frizzy hair, and dark skin. He likes to wear the traditional Thai male pants with a dagger as a weapon. He likes to exaggerate, and brag about his prowess with women. He speaks in a loud voice and will interrupt others out of eagerness to speak with them.		movement control of angry image: acted as if the angry man, tighten the wooden handle, control slightly leaned down and shaped hands stretched 30 degrees then shaking wooden handle then raised his hand and pointed out to the parties. Nodding during speaking and always laughing. When speaking his thumbs always up and down, his face turned to the right and to the left all the time, look funny.

Character image	Style	A character image designed animation	The postures manipulation and personalities that apply to the story
	Khwan Muang is a Buddhist. He is thin and rather short. He has a large paunch, and buttocks. He has a prominent nose, wide mouth, and dark skin. He is easily frightened, but tends to seek the pity or sympathy of others. He appears rather anxious for no reason. He is Arrogant.		movement control of crying image: tilted the face 30 degrees to the bottom of the screen, bring the hand of the shadow touches the face and talk with crying voice, using the hand to flip slowly for showing sadly crying. His lips stick together and wide, when he is talking his face turned to the right and to the left and thumbs up
	Samor is from Sakom Village in Jana District of Songkhla Province. He is tall and mostly thin, except for an arched back with protruding belly. He likes to wear a sarong and a hat typical of South Asians. He is a traditionalist who likes to scold others for not conforming to tradition. Uncompromising. That said, he likes to tease his friends, and is misogynistic. His accent resembles Thai Muslim speakers.		movement control of slapping image: pull the slapping hand into the body and then swing the hand to hit the screen again, at once, the parties shadow will be flipped very fast and showed the body which means was slapped very hard. Tongue trembling When speaking.Clear pronunciation and smiling during speaking, always use the index finger in front of the person who speaks. Looking at the left and right while speaking.

Appendix E: Research Study Videos

1. Digital Nang Talung Alpha Version Research Study Video:
   https://www.youtube.com/watch?v=_KO7Ib0ciHU

2. Still Pictures from the video

3. Digi Nang Talung Beta Version Research Study Video:
   https://www.youtube.com/watch?v=XeaAVwIdSO8

4. Still Pictures from the video

To control the characters, players can download the AR markers using a QR code on the first page, print them out, and attach the markers to a stick. The new AR markers have improved detection and accuracy, due to distinct patterns that cameras can easily recognize and process.

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Then select mode

Nu Nui
Nu Nui lives in a market town in Muang District of Songkhla Province. He is stocky and huge booty big fat belly. His skin is dark, and he carries a pair of scissors as a weapon. He likes to wear a sarong used by the older generation. He is easily persuaded by others, and tends to follow what his peers are doing. He is a bit slow, and can't really assert himself. He does not speak clearly.

For example, when players select the Nang Talung Theater mode, they must choose a character and can customise details such as hair color, glasses, shirt, and pants.

Players can then create their own room by selecting a scene from the five provided options or join an existing room.

After entering the room, players will be able to communicate with each other in real time using their microphones and control their characters with AR Marker version 2.0, which features improved image tracking efficiency.

For the 'Dodge COVID Ball' mini-game, the content reflects a dodgeball game with a focus on COVID-19 prevention and new normal guidelines.

In the 'Dodge COVID Ball' mini-game, players experience a scenario where a giant throws COVID virus balls at villagers. The goal is for the villagers to survive by avoiding these virus balls.