

Hikayat Putera Indra: A Digital Pop-Up Augmented Reality (AR) Book Using Hybrid Animation as a Medium for Digital Preservation of Malay Traditional Attire (Samping Songket)

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ABSTRACT

This study explores innovative strategies for preserving the rich cultural heritage of Malay traditional attire, with a particular emphasis on the *Samping Songket*, a garment deeply rooted in Malay identity and tradition. With younger generations exhibiting declining awareness and appreciation for this intricate cultural artifact, the research addresses the urgent need to bridge this gap through the integration of technology-driven educational tools. Central to this initiative is the development of *Hikayat Putera Indra*,

a digital pop-up augmented reality (AR) book designed to revive interest by blending storytelling with hybrid animation techniques. This interactive book not only narrates the history and significance of Samping Songket but also provides step-by-step demonstrations of traditional tying methods, transforming passive learning into an immersive experience. By incorporating 2D and 3D animation alongside AR technology, the project creates a dynamic platform that appeals to children and teenagers aged 10 to 17, fostering curiosity and engagement with Malay heritage. The study adopts a mixed-methods approach, combining semi-structured interviews with cultural experts from PERNILAM to extract valuable insights into the symbolism and historical narratives of Samping Songket. Additionally, structured questionnaires targeting 25 youth respondents measure awareness levels and interest in learning traditional tying techniques. This comprehensive research design ensures a robust analysis, yielding triangulated data that highlights a significant gap in knowledge regarding traditional attire. Findings reveal that the use of AR significantly enhances understanding and engagement, offering an effective means to safeguard intangible cultural heritage. Both expert evaluations and youth feedback affirm the project's success in reigniting interest and appreciation for Malay traditional attire. Ultimately, Hikayat Putera Indra exemplifies how modern technology can serve as a vital tool for cultural preservation, fostering intergenerational connections and ensuring that the artistry of Samping Songket endures as a cherished legacy for future generations.

Keywords: Samping Songket, Traditional Malay attire, Augmented reality (AR), 2D animation, 3D animation.

INTRODUCTION

Songket, a revered art form in Malaysia, is distinguished by its elaborate hand-woven fabric, incorporating gold or silver threads that create intricate designs (Yusnita et al., 2018). Rooted in the Malay words *Menyongket* or *Menyungkit*, meaning choosing or inserting, Songket stands as a testament to the refinement of Malay culture and craftsmanship. As highlighted by Songket Dunia (2020), the motifs and designs not only reflect exceptional weaving skills but also encapsulate the identity, aesthetic values, and cultural heritage of Malay society. The fabric's vibrant colors and balanced patterns contribute to its visual allure, making it a vital cultural artifact.

Malay costumes serve as symbols representing the grandeur of the garments, authority, social status, religious affiliation, and philosophical beliefs. The choice of fabric and styling in Malay costumes can differentiate between the wealthy and the less privileged, ordinary individuals and monarchs, as well as between unmarried women and widows. Preserving the identity and aesthetics of Malay festival costumes is of utmost importance. One notable aspect of Malay costume is the stylization of the *Samping Songket*. For example, when a married woman wears a sarong, she places a cloth on the backside. If the wearer is a virgin, the head of the sarong must be at the front. For men, unmarried individuals wear the Samping above the knee, while married men wear it below the calf.

The Samping Songket, when paired with the Baju Melayu, historically indicated social and economic status. The way it was worn could distinguish between inner and outer traders. Original inhabitants wore the Samping underneath the Baju Melayu (Berdagang Dalam – Inner Trader), while immigrants wore it over the shirt (Berdagang Luar – Outer Trader). Additionally, specific tying techniques such as Ikatan Pancung (reserved for royalty and nobility), Ikatan Kembung/Laksamana Melamar (worn by high-ranking officials during special occasions), and Ikatan Lingkup (worn by ordinary citizens) reflected the wearer's rank and status.

In this era of rapid technological advancement, the influence of modern ready-to-wear attire has gradually replaced traditional practices. Ready-to-use *Samping* is now widely available, diminishing the younger generation's knowledge and understanding of the traditional methods of tying and styling the

Samping Songket. This shift poses a significant threat to the preservation of this intangible cultural heritage.

One significant application of Songket is in the creation of the "Samping," a garment draped over trousers and extending from the waist to the knees. This piece varies in style across regions of Malaysia, such as the "Berbadan" of Johor and the "Dagang Luar" on the West Coast. Samping Songket has historically symbolized social status, with its use once restricted to royalty (Muhammad Hisyam et al., 2020). Over time, its availability expanded, making it accessible to all. However, while readymade Samping is widely available today, there is a growing concern that the traditional techniques of tying and the cultural knowledge surrounding it are fading, particularly among younger generations. The intangible cultural heritage embodied by Samping Songket is a living tradition passed down through generations. This heritage encompasses not only the fabric itself but the intricate methods of tying and wearing it. The erosion of these skills presents a significant gap in cultural preservation. Despite Songket's prominence as a symbol of Malay identity, limited efforts have been made to systematically document and teach the techniques and philosophies behind Samping Songket. The absence of engaging educational tools and resources further widens this gap, jeopardizing the transmission of cultural wisdom to future generations.

This study seeks to address this gap by focusing on the preservation and revitalization of the art of tying *Samping Songket*. Through the development of an augmented reality (AR) pop-up book titled "Hikayat Putera Indra," which integrates hybrid animation and interactive elements, the research aims to create an immersive educational experience. This innovative tool will be guided by the AAA Model (Analysis, Activity, and Authentic Assessment) to ensure effective engagement and learning, targeting young audiences and fostering a deeper appreciation of Samping Songket. The research holds significant benefits and importance as it ensures that the younger generation can sustain the correct usage of Samping Songket, preventing it from fading away. By gaining extensive knowledge on how to wear and utilize this traditional garment properly, they can truly embrace it as an integral part of the nation's culture and identity. Moreover, the younger generation will have a readily accessible platform that offers references and tutorials, enabling them to learn the art of tying and wearing Samping Songket with precision. This preservation of knowledge and skills is crucial in safeguarding Samping Songket as a cherished national heritage for generations to come.

LITERATURE REVIEW

Definition of Intangible Cultural Heritage

In recent years, the scope of cultural preservation and appreciation has expanded significantly, moving beyond the protection of physical monuments and artifacts to encompass the customs, practices, and traditions that are passed down through generations. This shift highlights the importance of safeguarding Intangible Cultural Heritage (ICH), as recognized by the United Nations Educational, Scientific and Cultural Organization (UNESCO). ICH represents not only the cultural expressions themselves but also the deep knowledge, skills, and values embedded within them, which are transmitted across time, reinforcing a sense of identity and continuity from the past, through the present, and into the future (UNESCO, 2003).

The preservation of ICH plays a crucial role in maintaining the diversity of the world's cultural expressions, reflecting the essence of human creativity and the adaptability of communities. Customs, dialects, rituals, and traditional practices form the core of many societies' identities. In a rapidly globalizing world, where cultural homogenization poses a significant threat, the protection of ICH emerges as a vital countermeasure to preserve the richness of cultural expressions (Bortolotto, 2007). This diversity not only benefits individual communities by fostering pride and cohesion but also enriches the global cultural landscape, offering multiple perspectives and innovative solutions to contemporary

challenges (Kurin, 2004). Moreover, ICH contributes to sustainable development by supporting economic growth through cultural tourism, traditional crafts, and local industries. As communities engage in preserving their heritage, they create opportunities for education, employment, and cultural exchange.

The intrinsic link between cultural heritage and identity underscores the need for inclusive approaches in preservation efforts. Engaging local communities, especially youth and marginalized groups, in the safeguarding process ensures the continuity and relevance of ICH. This participatory approach empowers communities, enabling them to reclaim their narratives and pass on their heritage to future generations. In conclusion, the preservation of Intangible Cultural Heritage is not merely an act of conserving the past but a forward-looking endeavor that enhances societal cohesion, economic resilience, and global diversity. As the world becomes increasingly interconnected, safeguarding ICH stands as a testament to humanity's shared values and the enduring richness of cultural plurality.

Preservation of Intangible Cultural Heritage using Technologies

Intangible cultural heritage (ICH) encapsulates the living traditions, knowledge, and skills that communities deem vital to their cultural identity and social cohesion. This heritage, encompassing oral traditions, performing arts, rituals, festivals, and craftsmanship, reflects the essence of cultural diversity across generations. The significance of preserving ICH has grown, especially as globalization and modernization pose threats to the continuity of these practices (Alivizatou-Barakou et al., 2019). UNESCO has emerged as a central force in safeguarding ICH, fostering initiatives that emphasize community participation and the use of innovative methodologies. By integrating modern technology, such as motion capture for dance or 3D modeling for artifacts, preservation efforts are evolving to ensure that even ephemeral cultural expressions are documented, analyzed, and shared across digital platforms, strengthening the link between past and future generations (Mohd Firdaus & Nur Zaidi, 2023).

In Malaysia, researchers and cultural practitioners are actively engaging with advanced tools to preserve and promote their rich cultural tapestry. Efforts such as the Virtual Collection of Asian Masterpieces (VCM), part of the Asia Europe Museum Network (ASEMUS), highlight Malaysia's commitment to conserving ICH through cross-cultural collaboration (Isa et al., 2018). This initiative exemplifies how partnerships between Asian and European museums harness computer graphics, digital archives, and media science to protect and revitalize cultural heritage. Additionally, Malaysian scholars are leveraging digital documentation techniques, including facial recognition and motion tracking, to capture the nuances of traditional performances and rituals, ensuring their authenticity and accessibility for future study (Mohd Firdaus & Nur Zaidi, 2023). These endeavors not only reinforce national pride but also contribute to a broader understanding of cultural diversity on a global scale.

Augmented Reality (AR) in the Field of Education

AR enhances the learning experience by complementing traditional educational methods rather than replacing them. While books have long been essential to learning, they must evolve to align with technological advancements. Integrating AR into books creates engaging and immersive educational experiences that benefit students by bringing digital content to life within their physical environment. These fusion increases interactivity and deepens student engagement.

Moreover, AR enables educators to develop tailored content, fostering better understanding and appreciation among learners. However, challenges such as technical issues and limited access to AR devices must be addressed. Despite these obstacles, the use of AR in education has consistently demonstrated its potential to make teaching and learning more effective and enjoyable (Altınpulluk & Kesim, 2016).

Augmented Reality Filters on Social Media Platforms: Spark AR

A filter is interactive digital tools that enhance real-world experiences by modifying users' surroundings, sparking curiosity, and encouraging engagement and sharing. Despite their potential, AR filters are underutilized in science education, though they aid in content understanding and problem-solving. For instance, Souto (2023) found that AR filters improved students' recognition of reaction types. Integrating AR with social media platforms like Instagram and Facebook offers valuable opportunities for chemistry teaching, but development requires specific skills and time. However, Souto's report highlights that creating AR filters with free software like Spark AR is simple, enabling collaboration between students and teachers to build thematic libraries.

Nonetheless the process of crafting and sharing AR filters through tools, like Spark AR is quite simple permitting students and educators to collaborate effectively. In their project at university or college level study group designing an AR book was carried out with the main goal of educating teenagers about "Ikatan Samping Songket". The book included AR filters that could be used on media platforms in order for students or users of the book to have a more engaging learning experience that sparks curiosity and encourages them to share it with others online thereby contributing toward making "Ikatan Samping Songket" more familiar, among young people.

An Animation Augmented Reality (AAR) Book Model

This research examines the development and effectiveness of an augmented reality (AR) book with integrated animation for teaching "Ikatan Samping Songket" to teenagers. Drawing on the AAR Model developed by Chujitarom and Jeerungsuwan (2017), the study explores how AR and animation enhance sustainable learning. The framework highlights the capacity of AR to engage learners, while animation presents content interactively. Applying the AAR Model ensured focused learning objectives, demonstrating that teenagers are well-suited to learning through AR animation. The study also underscores the need for a conducive environment with features like tablets and high-speed internet to maximize the potential of the AR book. Focusing on the traditional craft of tying Samping Songket, this research contributes to cultural heritage preservation while promoting sustainable learning.

Samping Songket

Malay traditional attire carries profound cultural significance, symbolizing social status, authority, and philosophical beliefs. According to Muhammad Hisyam et al. (2020), Malay costumes reflect the wearer's identity, distinguishing between the wealthy and the less privileged, monarchs and ordinary citizens, and even marital status. A prominent element of this attire is the *Samping Songket*, which plays a crucial role in preserving the aesthetics and identity of Malay festival costumes.

Technological advancements have influenced the accessibility and style of traditional attire. Muhammad Hisyam et al. (2020) note that the emergence of ready-to-wear *Samping* has replaced the traditional practice of tying and styling the *Samping Songket*. While this offers convenience, it has led to a decline in the younger generation's knowledge of traditional tying techniques, highlighting the need for cultural preservation and education. Historically, the way *Samping Songket* was worn indicated social and economic status. As described by Songket Dunia (2020), styles such as 'Berdagang Dalam' and 'Berdagang Luar' reflected whether individuals were local or immigrant traders. Techniques like '*Ikatan Pancung*' for royalty and '*Ikatan Kembung*' for high-ranking officials further signified rank. These variations, rooted in customs unique to each state, emphasize the deep connection between attire and Malay cultural identity.

In summary, harnessing modern technology to protect traditional practices, this study plays a vital role in preserving cultural heritage while fostering pride and continuity in Malay customs. It aims to bridge the generational divide, ensuring that the cultural significance of *Samping Songket* remains a cherished and vibrant part of Malaysia's heritage for generations to come.

The case of the *Samping Songket* underscores the broader significance of preserving traditional attire and practices. By documenting the various styles and techniques of tying the *Samping*, technological interventions address the erosion of traditional knowledge caused by modernization and mass production. This preservation effort highlights the deep philosophical and social meanings embedded in cultural attire, reflecting the wearer's identity, status, and heritage. In conclusion, the preservation of ICH through technology represents a forward-looking endeavor that bridges the gap between tradition and innovation. By leveraging digital tools, augmented reality, and social media, communities can safeguard their cultural legacies while promoting sustainable development and educational enrichment. This convergence of heritage and technology not only strengthens the resilience of cultural identities but also celebrates the rich diversity that defines humanity's shared cultural heritage.

RESEARCH METHODOLOGY

This study was conducted in a mixed-methods approach, by qualitative approach in phase 1 and quantitative in phase 2 to explore the cultural significance of *Samping Songket* in Malay heritage. Phase 1, interview method was chosen to gain direct insights from experts on traditional Malay attire, such as Mr. Danial Hafiz bin Abdul Ghani, a member of the *Persatuan Penggiat Seni Alam Melayu* (PERNILAM). This qualitative approach allows for an in-depth exploration of the philosophy, significance, and cultural symbolism of *Samping Songket*. Semi-structured interviews were conducted to produce comprehensive responses regarding the history, functionality, and variations of *Samping* tying methods. Key questions focused on the philosophy behind the attire, types of *Samping*, and the societal views on instant, ready-to-wear *Samping*. The expert's feedback provided valuable context and enriched the understanding of how *Samping Songket* intertwines with Malay heritage and reflects social hierarchy.

Phase 2, conducting a survey method in objective to collect variables of behaviour. A structured questionnaire was distributed to 25 respondents to collect quantitative data on the awareness and knowledge levels of the younger generation regarding various methods of tying the *Samping Songket*. The objective was to identify gaps in understanding and evaluate the cultural transmission of this tradition. The respondents, primarily youth, were surveyed about their familiarity with the three main tying techniques. An evaluation phase was conducted to assess the effectiveness of the research outcome. This phase involved both expert and layperson evaluations, represented by Mr. Danial Hafiz and a 12-year-old student, Mohd Faiz Musa. The evaluators were asked to provide feedback on the clarity, appeal, and educational value of the augmented reality book in demonstrating the three types of *Samping* tying methods. Their feedback underscored the potential of AR storytelling to foster cultural appreciation and retention among diverse age groups.

The data collected from interviews, questionnaires, and evaluations were analyzed using both qualitative and quantitative methods. Content analysis of the interview transcripts identified recurring themes related to the cultural significance and preservation challenges of *Samping Songket*. Statistical analysis of the questionnaire responses highlighted trends in knowledge gaps among the youth, reinforcing the need for targeted educational initiatives. Comparative analysis of the evaluation results provided insights into the effectiveness of AR as a learning tool, revealing its capacity to bridge generational divides and enhance cultural awareness. The analysis phase synthesized these findings to construct a holistic understanding of the current state of *Samping Songket* knowledge and the impact of technological interventions in preserving traditional practices.

DATA ANALYSIS

Interview Results

The researchers interviewed Mr. Danial Hafiz Abdul Ghani, a member of the 'Persatuan Pengkhiat Seni Alam Melayu' (PERNILAM) club and an expert on traditional Malay attire. Table 1 shows the key questions asked during the interview.

Table 1. Key Question for Mr. Danial Hafiz

No.	Question	Answer
1.	Please explain the philosophy of traditional Malay attire?	To give a basic definition, <i>Samping</i> is a side fabric. Malay people who wear <i>Samping</i> as a side fabric use it in their daily life and in emergencies. Uses include:
		Child-holding fabricTowelPrayer mat
		The philosophy behind <i>Samping Songket</i> varies depending on the customs of different regions. The term <i>Samping Songket</i> signifies the longstanding practice within the Malay community that has been upheld for many generations Meanwhile tradition denotes the practices inherited by the Malay community over time, with specific guidelines regarding how <i>Samping Songket</i> should be worn in certain settings

The interview revealed the underlying philosophy behind Malay clothing, particularly the *Samping Songket*, highlighting both its practical utility and deep cultural significance within Malay society. Beyond its decorative appeal, the *Samping* serves various functional purposes, such as being used as a child wrap, towel, or even a prayer mat, reflecting the adaptability and resourcefulness of the Malay community. This multi functionality illustrates how traditional attire transcends mere fashion, seamlessly integrating into daily life. The *Samping Songket* embodies cultural heritage, symbolizing the customs and values passed down through generations, thus preserving and connecting the past with the present. Its essence varies across different Malay groups, showcasing the rich diversity within Malay culture and how regional influences shape its style and usage. The interview also highlighted that in organizational contexts, the way the Samping Songket is worn signifies affiliations and hierarchies, blending tradition with formal protocols, further emphasizing its role as a living representation of Malay identity and heritage.

Table 2. Key Question for Mr. Danial Hafiz

No.	Question	Answer
2.	How many types of Samping Songket exist?	The methods of tying Samping Songket are diverse but what makes each Samping varied are the art of tying and the categories of Samping Songket itself. Variations in the art of tying: - Ikatan Samping Dagang Dalam - Ikatan Samping Dagang Luar Samping Categories: - Ikatan Sila



The interview findings offered valuable insights into the rich tradition of Samping Songket, a vital aspect of Malay attire, by emphasizing its diverse tying methods and categories. The variations in tying styles, such as "Ikatan Samping Dagang Dalam" and "Ikatan Samping Dagang Luar," reflect both aesthetic preferences and practical considerations, with no single method dominating. Tying Samping Songket is an intricate art form that demands skill and creativity, transforming the garment into a canvas for self-expression and craftsmanship. Techniques like "Ikatan Sila," "Ikatan Simpuh," and "Ikatan Pancung" cater to different occasions, roles, and appearances, underscoring the garment's adaptability and cultural depth. These methods not only enhance the visual appeal of the Samping but also signify identity, status, and adherence to tradition, reinforcing its role as a symbol of Malay heritage. By preserving and celebrating these techniques, Samping Songket remains more than just clothing—it stands as a living representation of culture and history that thrives in the modern era, ensuring its relevance and appreciation across generations.

Table 3. Key Question for Mr. Danial Hafiz

No.	Question	Answer
3.	What is your opinion on instant <i>Samping</i> or ready-to-wear <i>Samping</i> that use a zip?	An expert in traditional Malay attire firmly rejected the concept of instant Samping with zippers, emphasizing that such adaptations prioritize fashion over cultural authenticity. The expert expressed concern that individuals who opt for these simplified versions are seen as unwilling to invest the effort required to learn the traditional tying methods, valuing appearance over craftsmanship. This reliance on convenience, the expert warned, risks eroding

	the cultural knowledge surrounding Samping tying techniques, potentially leading to the loss of this important tradition for future generations.

The interview results offered insights into the longstanding customs of Samping Songket in Malay attire culture by showcasing its various tying techniques and classifications. The tying methods for Samping Songket exhibit diversity without a dominant approach in place as a result of blending aesthetic appeal with practical functionality. Patterns such as "Ikatan Samping Dagang Dalam" and "Ikatan Samping Dagang Luar" exemplify the utilization of styles tailored for distinct occasions or individual tastes. Creating a Samping Songket involves a blend of talent and imagination as it encompasses folds and intricate details that transform the fabric into more than just attire. It becomes a statement of individuality and craftsmanship appreciation. Variations like "Ikatan Sila," "Ikatan Simpuh," and "Ikatan Pancung" suit events and styles, by highlighting the flexibility and diversity of Samping. The various techniques for tying Samping Songket in styles highlight how important Samping Songket is in Malay culture by reflecting one's identity or social standing while also showing respect for tradition. This strong cultural connection of Samping Songket not preserves but also celebrates Malay heritage by turning it into something beyond just clothing—it becomes a living symbol of culture enriched with history that remains relevant in today's world. Understanding these elements better helps us recognize the beauty of Samping Songket significance preservation.

Table 4. Key Question for Mr. Danial Hafiz

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No.	Question	Answer	
4.	Is there any hidden meaning or symbolic matters in wearing Samping?	 Samping can be used in various ways to differentiate rank: Color: some are meant only for the reigning Sultan. One color is even meant only for a crown prince or a young king. Some colors are meant only for dignitaries. Certain colors are meant only for normal citizens. Tying methods can be used to indicate rank. For example, <i>Ikatan Pancung</i> is usually used for the children of a Sultan, while <i>Ikatan Lingkup</i> is used by normal citizens. 	

The interview disclosed that the tradition of wearing *samping* carries significance among the Malay community by reflecting social hierarchy and status symbols. According to the interviewee, *Samping Songket* transcends attire as it visually represents ones standing in society. The selection of colors in *Samping Songket* holds importance with certain colors designated for individuals based on their social standing. For instance, special colors are reserved for the Sultan as a symbol of their high status; other colors are set aside for crown princes or ordinary citizens. Each color serves as a marker of social standing, in a nuanced and refined manner. Moreover, the style of how the *samping* worn further signifies the important position; for example, "*Ikatan Pancung*" denotes royal heritage while "*Ikatan Lingkup*" is more commonly worn by regular citizens. Dressing up is more than putting on clothes. It's a way for people to show their status and who they are, by choosing certain colors and styles of wearing garments that reflect cultural customs and traditions.

These discoveries underscore the deep cultural importance of *Samping Songket* by showing how this customary dress serves as a visual communication medium that expresses an individual's social

status, legacy and sense of self. By incorporating this insight into the storytelling of *Hikayat Putera Indra*; An Interactive Virtual Reality Book can enrich the representation of *Samping Songket* providing audiences with a thorough knowledge and learning encounter. This incorporation promotes an understanding of the cultural customs intertwined in the traditional attire enhancing the overall educational journey.

Questionnaire Results

The results of the questionnaire indicate that the majority of the respondents were unaware of various ways of tying *Samping Songket*. This implies youngsters have little knowledge of the various techniques of tying *Samping Songket*, suggesting a decline in its appreciation and understanding. Figure 1 shows the concerning lack of knowledge among youngsters regarding *Samping Songket*.

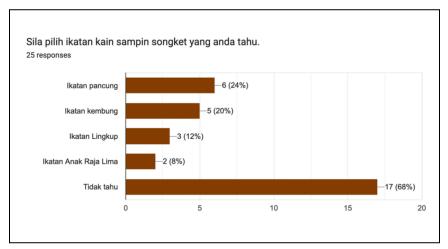


Figure 1. Questionnaire about various types of Samping Songket (Source: Author, 2024)

Based on the data analysis conducted by the researchers revealed three styles of tying *Samping Songket*; '*Ikatan Sila*,' '*Ikatan Simpuh*,' and '*Ikatan Pancung*.' However, it was also noted that most young individuals had limited awareness about the methods of tying *Samping Songket* which may contribute towards a decrease in its recognition and comprehension, over time leading it towards being overlooked and forgotten eventually.

Evaluation Results

To test the effectiveness of the research outcome—*Hikayat Putera Indra*: A Digital Pop-Up Augmented Reality Book (AR)—Mr. Danial Hafiz, an expert in traditional Malay attire from *Persatuan Pengkhiat Seni Alam Melayu* (PERNILAM), as well as a 12-year-old boy named Mohd Faiz Musa from SK Semaseh, became the first individuals to be interviewed to evaluate the outcome. Table 5 and table 6 show the responses of the two subjects.

Table 5. Outcome of the evaluation interview with Mr. Danial Hafiz

No.	Questions	Answers
1.	What is your opinion about the animated video	Educating people and delivering knowledge depend on the method used. The augmented reality story book <i>Hikayat Putera Indra</i> is acceptable for any age

		showing the methods of tying these three types of <i>Samping</i> ?	due to the straightforward and simple storyline. Hence, any children who watch or read this book will be able to easily understand the <i>Samping</i> knowledge contained in the book.
2	2.	Do you think it is effective for the audience to understand the methods of tying these three types	Some viewers of <i>Hikayat Putera Indra</i> may struggle to understand the intended context portrayed in the animation because of varying levels of interest in its significance, among the audience.
		of Samping?	Using augmented reality (AR) along with a story book is innovative approach in educating the community – particularly the younger generation.

Based on the information in table 5 from the discussion with the interviewee, it is apparent that the thoughts regarding the animated video demonstrating the three methods of tying *samping* emphasize how effective modern technology can be in educating and captivating audiences about the cultural importance of *Samping Songket*. They praised the augmented reality narrative *Hikayat Putera Indra* for its capacity in imparting knowledge through an engaging storyline that appeals across different age groups. The blend of storytelling with AR technology facilitates interaction, capturing the curiosity of young readers while nurturing a deeper understanding of the knowledge of *Samping Songket*. The interviewee mentioned a difficulty which some audiences might not fully understand the context because of differing levels of interest. However, the challenges using reality and storytelling as a commendable approach for engaging those intrigued by cultural heritage. The interview emphasizes the significance of employing techniques in closing generational and cultural divides by proposing that technology and storytelling have the potential to motivate younger people in discovering and appreciating the abundant legacy of *Samping Songket*.

Table 6. Outcome of the evaluation interview with Mohd Faiz Musa

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No.	Questions	Answers		
1.	What is your opinion about the <i>Hikayat Putera Indra</i> Augmented Reality book?	I think the book's design would definitely catch the eye of kids my age. I'd love to suggest it to my friends.		
2.	Do you think it is effective for the audience to understand the methods of tying these three types of <i>Samping</i> ?	The augmented reality features easily taught me to watch by myself the <i>Samping</i> tutorials that I desired.		

Based on table 6, the student's evaluation of the *Hikayat Putera Indra* augmented reality book highlights their appreciation of its design and educational value, particularly with regard to learning how to tie the three forms of *Samping*. The book's appealing illustrations and engaging activities kept the student interested, suggesting it would resonate well with this age group. The student's enthusiasm to recommend the book to his peers indicates its potential impact as peer recommendations often influence youth engagement. The use of augmented reality elements effectively met the study's goals to teach and retain knowledge about *Samping* knots, with the student learning effortlessly through these features, demonstrating the project's educational success.

The assessment indicated that the program effectively engaged and educated its intended audience of youth. Highlighting the impact of augmented reality and storytelling in safeguarding cultural heritage

traditions. The favorable responses indicated the project's achievements and its future value, for both students and their peers.

PROJECT DEVELOPMENT

The project began by selecting a title aligned with the research topic and identifying problem statements from relevant journals, guiding the formulation of research objectives and questions. A comprehensive literature review provided a thorough understanding of the research area. Data collection involved interviews and participant observation for qualitative insights, content analysis of interview data, and a questionnaire via Google Forms for quantitative data, informing the development of the digital pop-up AR book. Pre-production tasks included scripting, storyboard, environmental concept development, character design and book layout design, laying the groundwork for production. Animations were created during production using Adobe Animate, Blender, and After Effects, integrating 2D, 3D, and motion graphics, while Adobe InDesign was used for book development and Spark A.R. for AR features. Voiceovers were recorded to enhance the animations. In post-production, animated segments were synchronized with storyboard-determined camera angles, visual effects (VFX) were added, and voiceovers incorporated to align with the narration. User feedback on the book's effectiveness in promoting appreciation and understanding of *Samping Songket* was gathered through a questionnaire, concluding with a discussion summarizing the research outcomes.



Figure 2. Character design of Putera Indra and Arjuna (Source: Author, 2024)

Based on the illustration in figure 2 The digital pop-up AR book breathes life into the narrative of Hikayat Putera Indra by immersing the audience in a visually rich and interactive experience. Through the dynamic portrayal of *Putera Indra*, the audience witnesses his journey of growth, self-discovery, and lessons in responsibility. His mischievous and curious nature mirrors the adventurous spirit often found in classic folklore heroes, making him a relatable and engaging figure for younger audiences. The golden hues that dominate his attire serve as a visual reminder of his royal heritage, symbolizing both the privilege and expectations placed upon him. This design choice not only accentuates his status but also sets the stage for the contrast between his royal upbringing and the humility he encounters during his escapades outside the palace walls. The augmented reality elements further enhance the storytelling, allowing readers to experience pivotal moments such as Putera Indra's playful pranks and his dramatic escape firsthand, creating a deeper emotional connection to the unfolding tale. In contrast, Arjun from Kampung Niskala embodies wisdom and grounded, providing a necessary foil to Putera Indra's energetic and impulsive demeanor. Arjun's design, featuring earthy tones and simple garments, reflects the values of modesty and knowledge, traits that define his character. His role as a guide and mentor introduces themes of humility and learning, offering a broader perspective on the values that extend beyond royal privilege. Nadim Sri Nara, the loyal bodyguard, adds a layer of humor and camaraderie to the narrative, often finding himself at the mercy of Putera Indra's antics. His presence underscores the bond between protector and prince, highlighting the importance of trust and loyalty. The interplay between these three

characters enriches the narrative tapestry, offering audiences not just a tale of adventure but also one of growth, friendship, and the delicate balance between authority and compassion.

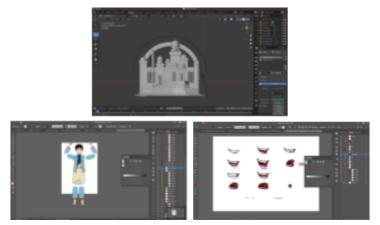


Figure 3. Assets for the environment, character, and mouth stock (Source: Author, 2024)

Since *Hikayat Putera Indra* featured a mix of animation styles, in its visuals. With the elements crafted using Blender 3D software to bring to life the majestic palace of the Kingdom of *Sri Bianglala* while character designs were meticulously hand drawn in 2D using Adobe Illustrator. Before being animated in Adobe After Effects as depicted in Figure 3.

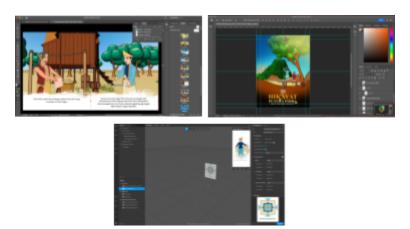


Figure 4. Augmented reality (AR) book and cover design; the AR features in the book (Source: Author, 2024)

Figure 4 shows the complete development process of *Hikayat Putera Indra*: A Digital Pop-Up Augmented Reality (AR) Book using Adobe InDesign software. The theme revolves around watercolors to accentuate the playfulness of the storybook. Careful consideration was given to the font choice, "Milkman," which balances fun and easy readability. The storyline follows the initial storyboard but adopts a more narrative approach, whose simplified presentation ensures easy comprehension for the audience. The book incorporates AR features created using Spark AR, which involved transferring frame-by-frame animation from a *Samping Songket* tying tutorial. To enable access to the AR elements, each of the *Samping Songket* forms is featured on a plane. The book also provides tutorials for the AR features, catering to users with no experience of augmented reality technology.



Figure 5. Augmented reality (AR) book: the final product (Source: Author, 2024)

Figure 5 shows the remarkable achievement of the researchers in creating an innovative and immersive final product, the *Hikayat Putera Indra*: Augmented Reality (AR) Book. The functionalities of Spark AR as a preferred platform for the researchers to create captivating AR elements that blend seamlessly with the book's material. The importance of this endeavor is underscored by its trials on Instagram. A widely accessible platform that allows a larger audience to engage directly with the augmented content featured in the book. This groundbreaking project not only exemplifies a creative storytelling method but also paves the way for innovative opportunities in learning tools and immersive entertainment experiences within the realm of augmented reality literature.

The researchers concluded that creating *Hikayat Putera Indra*: A Digital Pop-Up Augmented Reality (A.R) Book Using Hybrid Animation as a Medium for Digital Preservation of Traditional Malay Attire (*Samping Songket*) would help to educate individuals effectively by enhancing their comprehension and appreciation towards different tying methods as well as the philosophical significance, behind the history of *Samping Songket*. Through the use of technology, the researchers were required to accomplish an important objective with the incorporation of augmented reality (AR) and animation playing a crucial role in engaging the younger audience and capturing their attention.

DISCUSSION

The AR book of *Hikayat Putera Indra* was created with the aim of educating audiences about the cultural importance of *Samping Songket* while keeping them engaged in learning about it through modern technology like augmented reality (AR). Assessments the effectiveness of this initiative in achieving its goals of teaching *samping* tying techniques while instilling an appreciation for traditional Malay attire among the younger generation interviews were conducted with Mr.Danial Hafiz as specialist in traditional clothing. As well as Mohd Faiz bin Musa, 12-year-old student from 'Semaseh' primary school (SK Semaseh).

Mr. Danial Hafiz's interview reflects the success of the *Hikayat Putera Indra* AR book in achieving its educational goals. He commended the project for its straightforward and simple storyline, which makes it accessible to individuals of all ages, especially children. The integration of AR technology would enhance the engagement levels among young readers, ensuring they can easily understand the methods of tying the three types of *Samping*. The use of storytelling combined with AR was deemed thoughtful and commendable as it would bridge the generational gap and encourage cultural learning among young

audiences. However, Mr. Danial Hafiz pointed out a potential challenge in that some audiences would lack interest in cultural values, potentially hindering their complete understanding of the context. Nevertheless, overall, the positive aspects of the project were found to outweigh this limitation. Mohd Faiz Musa's evaluation reaffirmed the project's success among its target audience – young students such as him. The visually appealing design of the book would effectively capture the attention of children his age, encouraging them to explore its contents further. The integration of AR features would allow students to watch tutorials and learn the *Samping* tying methods in an interactive and enjoyable manner. Mohd Faiz's willingness to recommend the book to his friends highlights the project's potential to reach a wider audience through peer influence. The success of the project in teaching *Samping* knots is evident from the student's effortless learning experience using the AR elements.

The augmented reality book *Hikayat Putera Indra* has successfully met its objectives in education and preservation as indicated by positive feedback from both experts and students interviewed for the study. It was noted that this initiative effectively engages its target audience by promoting an appreciation for Malay attire while sparking curiosity about cultural heritage. The incorporation of AR technology with storytelling has proved to be an approach in capturing young minds and facilitating interactive learning experiences. The design and content of the project have struck a chord with its intended audience making it a valuable resource, for education purposes.

The *Hikayat Putera Indra* Augmented Reality Book can be deemed a successful cultural learning project, based on the positive outcomes observed during the interviews with Mr. Danial Hafiz and Mohd Faiz bin Musa. The project's ability to effectively teach and engage its target audience, primarily young students, demonstrates its impact on preserving and promoting cultural heritage. The combination of modern technology and traditional storytelling has proven a winning formula for bridging the inter-generational gap and instilling among the youth a sense of appreciation for *Samping Songket*. As a result, the *Hikayat Putera Indra* AR book represents a successful endeavor in the field of cultural education and preservation.

CONCLUSION

In conclusion, the researchers successfully developed *Hikayat Putera Indra*: A Digital Pop-Up Augmented Reality (A.R) Book Using Hybrid Animation as a Medium for the Digital Preservation of Malay Traditional Attire (*Samping Songket*) with primary goal is to educating the youth on methods of tying *Samping Songket* along, with its cultural significance. By using tools like augmented reality (AR) and animations in the books design aimed at engaging the younger audience between 10 and 17 years old effectively as an educational resource was successful, in holding the interest and attention throughout the *Samping Songket* tutorial section based on feedback received from participants who found it easy to understand the content provided. In this study project the researchers showcased how digital tools can be beneficial, in safeguarding and showcasing cultural aspects to help younger individuals better understand and value them.

Based on the research findings related to *Hikayat Putera Indra*: A Digital Pop-Up Augmented Reality (AR) Book, which employed hybrid animations to digitally conserve classic Malay clothing (*Samping Songket*) numerous insightful suggestions have been put forward for upcoming enhancements in this area of study. One suggestion is to consider using augmented reality (AR) technology that includes features like voice overs in tutorials to improve the learning process for a comprehensive experience and better understanding of instructional content especially for younger users who may find it easier to understand complex concepts, with audio guidance integrated into AR books.

Moreover, enhancing the features of this AR book by adding features like quizzes, games or simulations could promote a profound comprehension and enhance the learning experience to be more

interesting and engaging. It is also crucial to carry out usability trials and collect input from the intended audience during the development process to pinpoint any problems and areas, for enhancement guaranteeing that the end product meets user requirements effectively. Furthermore, Potential future research directions could explore expanding the scope of digital preservation to include interactive experiences that incorporate virtual and mixed reality (VR/MR) to create fully immersive environments. VR/MR technology could simulate historical settings or allow users to virtually try on traditional attire, enhancing engagement and understanding. Additionally, the development of digital flash card systems integrated with AR could serve as supplementary educational tools, reinforcing learning through quick, interactive sessions that make the content more accessible and digestible for younger audiences.

Other areas for future research could include the use of artificial intelligence (AI) to personalize learning experiences by adapting content to the user's progress and preferences. AI-driven AR books could offer real-time feedback or suggest additional cultural content based on user interaction. Gamification elements, such as interactive storytelling or achievement badges, could further enhance engagement and knowledge retention. Additionally, exploring mobile app extensions that allow users to access tutorials and cultural lessons on the go could increase accessibility and broaden the reach of the project.

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