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Designing AI-Assisted Animation for Malay Wedding Heritage Education: Visualising Minangkabau Wedding Ceremony in Negeri Sembilan for Children

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ABSTRACT

Minangkabau-influenced Malay wedding practices in Negeri Sembilan constitute a living cultural heritage in which ritual, family relations, clothing, objects, social interaction and community values are brought together in a single ceremonial context. Yet culturally specific wedding practices can be difficult for children to understand when heritage knowledge is communicated mainly through textual documentation, static images or adult-oriented explanations. This study develops a human-curated artificial intelligence (AI)-assisted animation framework for translating selected Minangkabau Malay wedding heritage in Negeri Sembilan into an accessible visual narrative for children. A design-based research-through-design approach is proposed, combining documentary and literature analysis, cultural content selection, visual translation, character and environment development, AI-assisted asset generation, animation prototyping and staged cultural and audience validation. The study contributes a nine-stage framework that moves from cultural authentication and interpretation to child-oriented translation, AI-assisted generation, human curation, cultural validation, animation and audience evaluation. The analysis emphasises that AI should function as a visualisation instrument rather than an autonomous producer of culture. It also establishes the design principle of "simplify the form, preserve the meaning", whereby visual complexity may be reduced for young audiences without removing culturally meaningful ritual, costume, object or social information. The proposed framework extends current digital heritage and animation research by connecting Minangkabau wedding heritage, child-oriented visual communication and responsible generative AI within a single culturally controlled design workflow.

Keywords: *Artificial Intelligence, Cultural Heritage, Malay Wedding, Minangkabau, Visual Animation*

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1 INTRODUCTION

Cultural heritage is not confined to monuments, collections or physical artefacts. The UNESCO 2003 Convention defines intangible cultural heritage (ICH) through practices, representations,

expressions, knowledge and skills recognised by communities, including social practices, rituals and festive events. Its continuing value lies not only in the cultural expression itself but in the knowledge and skills transmitted from generation to generation (UNESCO, 2003). UNESCO further emphasises that ICH is living and continuously recreated, meaning that safeguarding is concerned with viability and transmission rather than simply freezing a practice in an historical form (UNESCO, 2026a).

Wedding ceremonies are particularly relevant to this understanding because they bring together multiple dimensions of living heritage. A wedding may simultaneously involve ritual actions, kinship relationships, clothing, food, music, speech, etiquette, spatial arrangements and community participation. Documentation is therefore necessary but insufficient on its own. Digital preservation research has shown that intangible heritage knowledge may remain dependent on individual practitioners and may be inadequately documented, creating a need for sustainable forms of digital recording and communication (Wan Isa et al., 2018). The challenge becomes more complex when the intended audience is children, because documentation designed for scholars does not automatically provide an accessible learning experience.

The problem addressed by this study is consequently one of cultural translation. Children may encounter heritage through photographs, written descriptions, museum labels or adult explanations, yet these formats can leave relationships among ritual action, symbolic meaning and social context implicit. Recent animation research indicates that animated educational narratives can make heritage histories more accessible to primary-school audiences when visual and narrative elements are deliberately structured for learning (Bian et al., 2025). A recent study of animation-based industrial heritage learning likewise highlights the importance of perceptual, cognitive and affective considerations when children process continuously changing audiovisual information (Zhang et al., 2026). The implication for cultural heritage design is not that animation is automatically educational, but that animation becomes useful when its visual language is intentionally aligned with the learner, the content and the learning purpose.

This issue is especially significant for Negeri Sembilan, where Malay cultural identity is historically connected with Minangkabau heritage and Adat Perpatih. The official Negeri Sembilan Government describes Adat Perpatih as originating in the Minangkabau world and identifies its continuing matrilineal basis while also noting that the system has been modified over time (Government of Negeri Sembilan, 2026). Sukri and Radzuan (2019) similarly describe Adat Perpatih in contemporary Negeri Sembilan as a blended customary system associated with Minangkabau migration and identify continuing practices related to belonging, identity, place attachment, customary land, merantau and muafakat. These accounts establish the cultural specificity of Negeri Sembilan and caution against treating its wedding traditions as interchangeable with a generic representation of "Malay weddings".

Research on local communities also demonstrates that Minangkabau-related cultural practices in Negeri Sembilan are dynamic rather than static. Taharuddin and Amran (2018), in their study of Kampung Gagu, Jelebu, documented cultural assimilation through interviews and photographic documentation and associated cultural change with economic development and other social forces. Such findings reinforce the importance of treating heritage as a living and changing system. A digital animation therefore should not claim to reconstruct a single timeless "authentic" wedding. Instead, it should identify a clearly documented cultural configuration and communicate its meanings transparently.

The proposed study focuses on this translation problem through the design of an AI-assisted animated narrative for children. AI is not positioned as a creator of Minangkabau culture. Rather, it is treated as a production instrument that can support rapid visual ideation, variation and asset development under human direction. This distinction is increasingly important because recent generative-AI heritage research identifies cultural bias, Western-centric training data and culturally inaccurate outputs as risks requiring explicit value constraints and human curation (Yu & Li, 2026). Research on multimodal cultural-heritage animation similarly identifies cultural authenticity and narrative coherence as important technical and design concerns (Li, 2026).

The article therefore proposes a culturally controlled workflow: cultural documentation is interpreted by the researcher and designer, AI is used to generate visual alternatives, human selection and correction follow, and cultural validation is treated as a necessary gate before final animation. The central design proposition is that cultural heritage requires cultural translation, not merely cultural documentation. The study asks how selected Minangkabau Malay wedding practices in Negeri Sembilan can be translated into a child-friendly, animated narrative while retaining their cultural meaning, visual identity and social context.

1.1 Cultural Heritage and the Problem of Intergenerational Transmission

Intergenerational transmission is central to the safeguarding of living heritage. UNESCO explains that the viability of ICH depends on the continued transmission of knowledge and skills from person to person and from generation to generation, while migration, urbanisation, changing social conditions and weakening contact between generations may create challenges for transmission (UNESCO, 2026a). Education can complement community-based transmission by creating additional spaces in which younger people encounter local knowledge, provided that the community remains central to decisions concerning its heritage (UNESCO, 2026b).

For children, transmission is not simply a matter of receiving information. They need to recognise who performs a practice, what happens, what objects are involved, where the activity occurs and why it matters. This suggests a shift from an archival model to an interpretive model. In the archival model, the primary question is whether cultural information has been recorded. In the interpretive model, the question is whether recorded knowledge has been transformed into an understandable representation without distorting its cultural significance.

Animation is relevant to this problem because it can coordinate image, movement, dialogue, sound and temporal sequencing. Bian et al. (2025) demonstrated the use of animated educational video to communicate industrial heritage to primary-school learners and incorporated user feedback into the evaluation process. Within Malaysian cultural contexts, research has also reported the potential of animation and digital games to foster recognition and appreciation of cultural identity among younger audiences (Abd Rahman & Sidek, 2023). These studies do not establish that every animation produces heritage learning, but they support the use of carefully designed animation as a medium for cultural communication.

1.2 Minangkabau Heritage, Adat Perpatih and Negeri Sembilan

Negeri Sembilan provides a particularly appropriate context for examining culturally grounded animation because its heritage cannot be fully explained through a generic Malay cultural framework. The official state description identifies Adat Perpatih as a variation of the Minangkabau customary system and describes it as a dynamic social system covering family, land, social relationships, customary authority and other aspects of community life (Government of Negeri Sembilan, 2026). The state source also emphasises that Adat Perpatih has changed over time rather than remaining static.

Sukri and Radzuan (2019) provide a complementary scholarly account based on interviews and participant observation with 12 community participants. Their analysis identifies identity and belonging, customary land, merantau and muafakat as continuing areas through which Adat Perpatih can be recognised. These findings are relevant to visual storytelling because they demonstrate that the cultural meaning of adat is embedded in relationships and social organisation, not only in decorative motifs.

Marriage is one of the areas in which adat, family relationships and community practices intersect. Documentation of Rantau, Negeri Sembilan, for example, specifically records the wedding tradition of istiadat menyalang (Idris, n.d.). Earlier work on Adat Perpatih and wedding ceremonies in Negeri

Sembilan has likewise examined the influence of customary practice on marriage-related ceremonies. Consequently, a visual narrative about a Negeri Sembilan wedding should identify its geographic and cultural scope rather than implying that all Malay weddings follow the same sequence.

The distinction matters for AI-assisted visual generation. A text prompt such as "traditional Malay wedding" is too broad to guarantee a Negeri Sembilan or Minangkabau-informed representation. It may generate generic regional clothing, architecture or ceremonial behaviour. A culturally grounded workflow instead begins with verified cultural descriptors and visual references, then uses those materials to constrain the design process. In this study, the cultural source is therefore treated as the authority for what may be represented, while AI is treated as a tool for exploring how it may be represented.

1.3 From Cultural Documentation to Animated Interpretation

The proposed translation process can be represented as a chain of increasing visual mediation: cultural documentation → cultural interpretation → visual simplification → character and environment design → animated narrative → child cultural learning. Each stage introduces a design decision. Documentation identifies what is known; interpretation determines what is significant; simplification determines what a child can readily perceive; design gives the selected content a visual form; and animation establishes sequence, emphasis and emotional rhythm.

The principle is not to reproduce every detail. Children do not need a complete ethnographic record in one short animation. They need a coherent narrative in which selected cultural elements remain recognisable and meaningful. The design problem is therefore one of selective fidelity. Cultural information that is essential to identity or ritual meaning should be protected, while secondary visual detail may be reduced to control cognitive and visual complexity.

Recent Idealogy Journal research supports the relevance of this approach. Studies of animated storybooks have emphasised timing, rhythm, staging and hierarchy as mechanisms for guiding attention and narrative clarity, while research on digital narratives for Malay folklore highlights the potential of animation, motion graphics and related digital formats to connect traditional content with younger, digitally oriented audiences (Norazhar et al., 2026; Zulkhairil et al., 2026). These studies also reinforce a recurring issue: digital translation must preserve cultural meaning rather than merely reproduce attractive imagery.

1.4 AI as a Design and Visualisation Instrument

Generative AI introduces a new production condition. Designers can generate multiple character, costume, environment and prop alternatives quickly, potentially reducing the time required for visual exploration. However, speed does not equal cultural validity. Yu and Li (2026) demonstrate that generative AI can reproduce culturally biased or Western-centric outputs and argue for value-sensitive constraints that keep heritage-oriented design connected to human judgement. Their study is particularly relevant because it positions AI as an amplifier of design activity while retaining cultural curation and critical judgement as human responsibilities.

Li (2026) approaches cultural animation from a multimodal perspective, arguing that text, visual and auditory information need to remain coherent throughout digital animation generation. This reinforces the need for a production workflow in which the cultural source is not separated from the final audiovisual representation. In a wedding animation, for example, the meaning of a ceremonial action may depend on who performs it, what is said, what is worn and how the community participates. Generating each asset independently can produce visual consistency at the surface level while weakening cultural coherence.

Accordingly, this study proposes a human-curated AI workflow: cultural expert or documentary source → researcher → visual designer → AI generation → human selection and correction → cultural validation → animation. The workflow deliberately inserts human judgement before and after AI generation. It also records rejected outputs because these failures can reveal recurrent problems such as generic costumes, inappropriate architecture, incorrect objects, anachronistic environments or culturally implausible character behaviour.

The approach is consistent with the ethical orientation of UNESCO's intangible heritage principles, which emphasise community participation, transparent collaboration, consultation and respect for the rights and interests of communities in research, documentation and adaptation (UNESCO, 2026c). AI-assisted heritage design should therefore be treated as a mediated cultural practice rather than a neutral technical process.

1.5 Children as the Intended Audience

The child audience changes the design requirements. A scholarly description may explain a ritual through historical terminology and contextual detail, whereas a child-oriented animation must establish meaning through a smaller number of visually and narratively salient cues. Characters, facial expression, movement, colour, sound, repetition, short dialogue and visual sequencing can work together to make unfamiliar content approachable.

This does not mean that heritage should be made simplistic or culturally generic. The relevant concept is child-friendly visual communication: the visual form should reduce unnecessary complexity while preserving information that carries cultural meaning. A child may not need to see every architectural detail of a traditional setting, but the environment should still communicate the social and spatial context of the ceremony. Similarly, a costume can be simplified into a clear animated silhouette while retaining documented features that distinguish the cultural context.

The term “cute” is therefore treated cautiously in this study. Rather than using cuteness as an unexamined aesthetic preference, the proposed visual language is described as soft, simplified, expressive, approachable and emotionally inviting. This framing connects aesthetic choices to communication purposes. It also helps avoid the risk of turning cultural heritage into decorative entertainment detached from meaning.

1.6 Research Gap

The literature reveals three related but insufficiently integrated research streams. The first documents Minangkabau heritage, Adat Perpatih and cultural practices in Negeri Sembilan. The second examines animation, digital storytelling and multimedia as mechanisms for heritage education and intergenerational communication. The third explores generative AI as a contemporary design and content-generation technology while identifying cultural authenticity, bias and human oversight as major concerns.

What remains underdeveloped is a design framework that connects these streams specifically for Minangkabau-influenced Malay wedding heritage in Negeri Sembilan and specifically for children. The gap can therefore be expressed as the intersection of four concerns: Minangkabau wedding heritage, child-oriented animation, AI-assisted visual design and cultural authenticity. The present study addresses this intersection through a research-through-design framework in which cultural evidence governs the visual generation process.

1.7 Research Objectives

RO1: To identify the cultural and visual elements of Minangkabau-influenced Malay wedding heritage in Negeri Sembilan that are appropriate for children's animated heritage representation.

RO2: To develop an AI-assisted animated visual narrative representing selected wedding-related cultural practices for child audiences through a human-curated design workflow.

RO3: To formulate design principles for culturally grounded, child-friendly AI-assisted animation of Malay wedding heritage.

2 REVIEW OF RELATED LITERATURE

2.1 Intangible Cultural Heritage and Wedding Ceremony

UNESCO's 2003 Convention establishes social practices, rituals and festive events as domains through which intangible cultural heritage is expressed. It also emphasises that ICH is community-based and continuously recreated (UNESCO, 2003). This definition is useful for wedding heritage because a wedding is not simply a collection of objects or a sequence of images. It is a social practice through which communities enact relationships, values and shared knowledge.

From a design perspective, the distinction between tangible and intangible dimensions is important. Clothing, ceremonial objects, food and architecture can be drawn, photographed or modelled. However, the meanings of these elements depend on action and context. A ceremonial object without its function may become a decorative prop; a costume without its social context may become a generic “traditional” costume. Therefore, animation should communicate relationships among object, action and meaning.

Digital preservation research in Malaysia has identified the need to document intangible cultural knowledge because knowledge and skills may remain concentrated in individual practitioners (Wan Isa et al., 2018). Digital media can contribute to accessibility, but documentation should not be mistaken for safeguarding itself. UNESCO emphasises that safeguarding requires continuing transmission and community involvement, including participation in defining and managing heritage (UNESCO, 2026a, 2026c).

2.2 Minangkabau, Adat Perpatih and Negeri Sembilan Wedding Heritage

The cultural foundation of the study is the relationship among Minangkabau heritage, Adat Perpatih and Negeri Sembilan Malay society. The Negeri Sembilan Government describes Adat Perpatih as originating from the Minangkabau world and identifies the matrilineal principle as a continuing basis despite historical modification (Government of Negeri Sembilan, 2026). Sukri and Radzuan (2019) similarly frame contemporary Adat Perpatih as a blended system that has developed through historical interaction and social change.

Taharuddin and Amran (2018) demonstrate the importance of examining local communities when studying Minangkabau cultural continuity. Their Kampung Gagu study used interviews and photographic documentation and identified social and economic development as forces contributing to cultural change. This is methodologically important for the present research because it indicates that cultural representation should be grounded in local documentation rather than in a single generalized description of Minangkabau culture.

Marriage traditions provide a particularly productive design domain because they involve people, clothing, ritual actions, food, music, movement and social relationships. Idris's documentation of istiadat menyalang in Rantau demonstrates that specific wedding traditions can be located within the Adat Perpatih context (Idris, n.d.). The implication is that the proposed animation should state its cultural and geographic scope and should avoid claiming to represent every wedding practice in Negeri Sembilan.

2.3 Animation as Cultural Heritage Communication

Animation offers a temporal structure that static heritage documentation does not provide. A designer can show a character preparing, moving, greeting, participating in a ritual and reflecting on its meaning. This allows process knowledge to be represented as action rather than described only in text.

Bian et al. (2025) provide a direct example of animated educational video for heritage learning with primary-school students. Their study combined animation design with user testing, demonstrating the value of evaluating whether an animated narrative communicates knowledge and appreciation to the intended audience. Abd Rahman and Sidek (2023) similarly examined folklore-themed animation and digital games within Malaysian educational institutions and reported the potential of culturally grounded digital media to strengthen recognition of Malaysian cultural identity.

Recent Malaysian design research also provides relevant precedents. Norazhar et al. (2026) examined motion design principles in animated storybooks and highlighted timing, rhythm, staging and hierarchy as mechanisms for supporting narrative clarity. Zulkhairil et al. (2026) reviewed digital narrative approaches for Malay folklore and identified animation, motion graphics, games and virtual reality as potential approaches for connecting traditional narratives with Generation Alpha. These studies position animation not merely as decoration but as a communication system.

2.4 Child-Friendly Visual Communication

Children process audiovisual material through limited perceptual and cognitive resources. Recent animation-based heritage research draws on multimedia learning and cognitive-load perspectives to argue that effective animation should guide attention toward relevant information rather than overload learners with simultaneous visual events (Zhang et al., 2026). A simple composition can therefore be academically justified when it protects narrative hierarchy and supports comprehension.

The proposed design uses five linked principles. First, recognisable silhouettes should make characters and objects identifiable. Second, expressive faces and gestures should communicate social relationships and emotional tone. Third, visual hierarchy should distinguish the main ritual action from secondary background detail. Fourth, narrative repetition should reinforce key cultural terms and meanings. Fifth, motion should be purposeful rather than continuous or decorative.

These principles support the study's distinction between visual simplification and cultural simplification. Visual simplification removes unnecessary perceptual complexity; cultural simplification removes meaning. The first is desirable when it supports learning, while the second should be avoided.

2.5 Generative AI and Heritage Design

Generative AI changes the economics of visual prototyping by enabling rapid generation of alternative images and styles. In heritage design, however, the same capability creates a representational risk: a system can produce a convincing image that is culturally wrong. The visual quality of an AI-generated image can therefore conceal inaccuracies rather than expose them.

Yu and Li (2026) address this issue through a value-sensitive design approach in which cultural authenticity, transparency and generative preservation are treated as design values. Their argument is useful for the present study because it shifts the emphasis from “Can AI generate the image?” to “What cultural conditions must govern the generation and selection of the image?”

Li (2026) similarly demonstrates the importance of multimodal coherence in cultural animation. If visual, textual and auditory components are generated without shared cultural constraints, the resulting narrative may be technically coherent but culturally fragmented. Pitri et al. (2026), working on AI-

supported folk heritage storytelling for early childhood education, likewise emphasise pedagogical intentionality, cultural sensitivity and ethical oversight, while identifying the need for further empirical validation in real educational settings.

The literature therefore supports a human-in-the-loop model. AI can expand the design search space, but cultural experts, researchers and designers remain responsible for interpreting evidence, rejecting inappropriate outputs, correcting visual inconsistencies and documenting the rationale for final choices.

2.6 Proposed Conceptual Framework

The conceptual framework integrates cultural authentication, visual translation and responsible AI generation. It treats the cultural source as the upstream constraint and audience evaluation as the downstream test. The framework is deliberately iterative: findings from validation can return the process to earlier stages rather than assuming that the first generated output is final.

Table 1 Proposed Minangkabau Wedding AI Animation Framework

Stage	Design activity	Primary question	Expected output
1. Cultural Authentication	Identify documented practices, terms, costumes, objects, spaces and social roles.	What can be supported by cultural evidence?	Verified cultural content set
2. Cultural Interpretation	Map each selected element to its ritual or social meaning.	Why does this element matter?	Meaning map
3. Child Translation	Reduce language, visual complexity and narrative length.	How can a child recognise and understand it?	Child-oriented content specification
4. Character & Environment Design	Develop culturally grounded characters, costumes, props and settings.	How should the heritage appear?	Visual design bible
5. AI-Assisted Generation	Generate controlled visual alternatives using documented prompts and references.	What visual options can be explored efficiently?	Candidate assets
6. Human Curation	Select, reject, edit and combine AI outputs.	Is the output culturally and narratively appropriate?	Curated assets
7. Cultural Validation	Review outputs with relevant heritage/cultural specialists.	Does the representation remain culturally defensible?	Validated/revision list
8. Animation & Storytelling	Sequence assets with movement, dialogue, sound and pacing.	How should the cultural story unfold?	Animated prototype
9. Audience Evaluation	Test recognition, comprehension, engagement and cultural curiosity.	Can the intended audience understand the representation?	Evaluation evidence

(Source: Authors' proposed framework, informed by the reviewed literature.)

3 METHODOLOGY

3.1 Research Design

The survey method is used in this study to evaluate the cultural fidelity, clarity and pedagogical appropriateness of an AI-enhanced animation on Malay wedding traditions in Negeri Sembilan. This survey is intended to systematically collect responses about the proposed animation and how it depicts the Minangkabau heritage, Adat Perpatih and selected wedding customs. The study outline does not

state that participant testing has been finalised, therefore the survey is presented as a proposed method of assessment and not a finished phase of data gathering.

The survey is intended to be filled by evaluators who have relevant knowledge such as cultural heritage academicians, practitioners of Negeri Sembilan or Adat Perpatih, Malay culture experts, animation or visual communication experts and primary education professionals. The collectives are incorporated to get views on cultural representation and the appropriateness and conveyance of the animation for young audiences.

The survey covers aspects of cultural fidelity including depictions of ceremonies, social roles, dress, artefacts and environments. It asks whether the practices selected are adequately contextualised and whether local variations are distinguished from those that are more widely recognised;

A further section evaluates the aesthetic and narrative qualities of the animation. Elements relating to visual appropriateness, character and costume design, clarity of sequence, consistency of character identity and to what extent the animation is clarifying the importance of cultural components rather than just showing them as visuals.

The survey also touches upon educational suitability. Critics are asked to evaluate the clarity of the explanations, suitability for the target age group, capacity to increase children's awareness and understanding of the selected practices, and potential to arouse interest and cultural curiosity. These are assessment standards, not assumed outcomes.

The survey will be distributed to the selected groups of reviewers upon completion of the animation prototype or relevant story board materials. Once decided, the distribution methodology, recruitment process, number of respondents and survey duration needs to be documented. These details are not present in the current study framework. No claims are therefore made about a completed distribution or response rate.

Before being disseminated, the questionnaire has to be tested for consistency and coherence with the aims of the study. Respondents should be informed of the objective of the survey and the way in which their answers will be used. If minors are to be included as participants in a subsequent assessment, the research must have ethical approval and parental/guardian consent, using methods appropriate to the age of the minors.

Responses to the survey should be categorised according to the assessment domains of the questionnaire: cultural fidelity, visual relevance, narrative coherence, and educational appropriateness. Each category can be summarised concisely by descriptive closed-ended answers. This classification allows to point out aspects that evaluators see positively, together with aspects that need to change.

Free-text type answers should be sorted into themes. Comments should be sorted into categories such as identifying errors, ambiguities, inappropriate simplifications or suggestions for improvement. Comments may also be attached to specific scenes, characters, costumes or cultural aspects when appropriate. This procedure enables an organised review without the opinion of a single reviewer being considered the ultimate truth.

It is important to regard the results as feedback from the participants who completed the survey and not as evidence that the animation improves the children's understanding or cultural awareness. Any statements about the recognition, comprehension, recall or engagement of children must be separately evaluated against the audience and only released upon completion of that evaluation. The survey results will be used to inform future iterations of the animation to improve its cultural fidelity, visual relevance, narrative coherence, and educational efficacy.

3.2 Cultural Content Analysis

The first stage analyses documentary and scholarly sources relating to Minangkabau heritage, Adat Perpatih and wedding traditions in Negeri Sembilan. The source base includes the Negeri Sembilan Government's description of Adat Perpatih, scholarship on contemporary Adat Perpatih practices, local documentation of wedding traditions and relevant Idealogy Journal research on Malay cultural continuity and digital heritage. UNESCO materials are used to establish the broader principles of community-based intangible heritage transmission.

Content is coded into five design categories: ritual/action, people/social role, costume/appearance, object/material culture and place/environment. A sixth category, meaning, is used to connect each visual element to its cultural function. This coding prevents the animation from becoming a catalogue of attractive objects without explanation.

Table 2 Cultural Content Selection Matrix

Category	Selection question	Design treatment	Validation requirement
Ritual/action	Is the action documented and culturally meaningful?	Represent as a short, readable sequence.	Check action order and participants.
Social role	Who performs, observes or supports the practice?	Use character relationships and staging.	Check role attribution.
Costume	Which features identify the cultural context?	Simplify silhouette while retaining key features.	Compare with documentary evidence.
Object	Does the object have a recognised function or meaning?	Use as a narrative prop rather than decoration.	Check form and function.
Place/environment	What spatial context supports the practice?	Reduce background detail but retain contextual cues.	Check cultural plausibility.
Meaning	What should the child understand about the element?	Convert meaning into short dialogue or visual action.	Check interpretive accuracy.

(Source: Authors' design protocol.)

3.5 Animation and Narrative Design

The proposed animation uses a short linear narrative because a child audience benefits from clear sequencing and limited simultaneous information. The story begins with place and cultural context, introduces the family and wedding preparation, presents selected ceremonial actions, explains their meanings and closes by connecting the practice to intergenerational transmission.

The narrative should not invent a ceremonial order simply because it is visually convenient. Where documentary sources do not establish a universal sequence, the script should use explanatory language such as “in this community” or “one documented practice is…” rather than presenting a local variation as the only correct form. This is an important distinction between storytelling convenience and cultural accuracy.

Table 3 Proposed Animated Narrative Sequence

Scene	Narrative purpose	Visual focus	Learning cue
1. Welcome to Negeri Sembilan	Establish geographical and cultural context.	Child narrator, landscape, culturally grounded setting.	This story comes from a specific place.
2. Minangkabau Heritage and Adat Perpatih	Introduce the cultural relationship without overloading the child.	Simple map/visual relationship and family/community imagery.	Heritage is connected to history and living practice.
3. Preparing for the Wedding	Introduce people, clothing and objects.	Characters preparing; costume details; selected props.	Objects and clothing have cultural roles.
4. The Wedding Ceremony	Present selected documented practices.	Short action sequences with controlled staging.	Rituals are actions with meaning.
5. Family and Community	Show social relationships.	Group composition, greetings, shared activity.	Heritage is practised by people together.
6. What Does It Mean?	Make cultural meaning explicit.	Narrator explains selected terms through visual examples.	Knowing the name is different from understanding the meaning.
7. Passing Tradition Forward	Connect heritage to children.	Older and younger characters together.	Living heritage continues through transmission.

(Source: Authors' proposed narrative structure.)

3.6 AI-Assisted Production Workflow

The AI production workflow is documented as an auditable sequence rather than an opaque creative step. Each prompt should contain culturally specific descriptors derived from the source matrix, together with constraints concerning age appropriateness, visual style, setting and character continuity. Generated outputs should be archived with prompt versions, dates, model/tool information and selection status.

Rejected outputs should also be documented because they provide evidence of where generative AI fails. Typical rejection categories may include inaccurate costume construction, generic regional styling, incorrect ritual actions, implausible spatial arrangements, anachronistic objects, culturally inappropriate gestures or inconsistent character identity. Such records transform AI failure from an invisible production inconvenience into analysable research data.

The workflow is explicitly human-curated. AI-generated assets are never accepted solely because they are visually attractive. The acceptance criterion is whether the asset satisfies the cultural, narrative, visual and audience requirements simultaneously.

Table 4 AI-Assisted Asset Control Protocol

Checkpoint	Question	Decision	Documentation
Cultural source	Is there a documentary basis?	Proceed / hold	Source reference and excerpt.
Prompt specification	Does the prompt encode the relevant cultural constraints?	Revise / generate	Prompt version.
AI output	Does the image satisfy basic visual requirements?	Keep / reject	Output ID and reason.
Human correction	What changes are required?	Edit / regenerate	Correction notes.
Cultural validation	Is the representation culturally defensible?	Approve / revise	Reviewer comments.
Animation integration	Does the asset function in sequence?	Use / rework	Storyboard reference.

(Source: Authors' proposed AI governance protocol.)

3.7 Cultural Validation and Audience Evaluation

A later validation phase should involve cultural heritage scholars, Negeri Sembilan or Adat Perpatih practitioners, Malay cultural specialists, animation/visual communication specialists and primary education specialists. The purpose is not to establish one individual's version as universally authoritative, but to identify inaccuracies, ambiguities and inappropriate simplifications through informed review.

The cultural validation rubric should assess cultural accuracy, symbolic accuracy, costume accuracy, ritual accuracy, visual appropriateness, narrative clarity and child suitability. Audience evaluation should separately assess recognition, comprehension, recall, engagement and cultural curiosity. This separation is important: an animation can be visually attractive while still failing to communicate cultural meaning.

If child testing is subsequently conducted, ethical approval, parental/guardian consent and age-appropriate procedures should be obtained. Results should be reported as evidence from the specific participant group rather than generalized to all children. Until such testing is completed, the present study treats child engagement as a design objective and evaluation criterion, not an established outcome.

4 RESULTS AND DISCUSSION

Because this article is structured as a design-based prototype study without completed human-participant testing, the results reported here refer to the analytical and design outputs of the proposed workflow. They do not claim measured learning gains or statistically demonstrated improvements in children's cultural awareness. This distinction is important for methodological transparency.

4.1 Result 1: Cultural Heritage Requires Selective Visual Translation

The first design result is a translation model in which cultural information is progressively converted from documentary knowledge into visual narrative. The process is not a direct conversion from text to image. It requires an intermediate interpretation layer that identifies which cultural meanings must survive visual simplification.

For example, a documented ceremonial action can be translated into an animated sequence consisting of participant → preparation → action → social response → short explanation. The visual sequence communicates not only what happens but also who participates and why the action is included. This is more appropriate for children than reproducing a long textual description on screen.

The resulting principle is: "Translate the cultural relationship, not only the cultural object." A wedding costume shown without its social context is visually recognisable but educationally incomplete. A costume shown on a character who is preparing for a documented ceremony, with a short explanation of its role, becomes part of a meaningful narrative.

4.2 Result 2: Child-Friendly Design Is a Form of Visual Mediation

The second design result is the formulation of child-friendly visual communication as a mediation strategy. Simplified characters, clear silhouettes, expressive faces, controlled backgrounds and purposeful motion are not treated as superficial stylistic choices. They regulate how much information the viewer must process at a given moment.

This interpretation is consistent with recent animation-learning research, which emphasises the importance of managing perceptual and cognitive resources when learners process dynamic visual information (Zhang et al., 2026). It also aligns with Idealogy Journal research on animated storybooks, where timing, rhythm, staging and hierarchy were identified as important for guiding attention and narrative clarity (Norazhar et al., 2026).

The practical implication is that cultural accuracy and child accessibility should be designed together. A visually dense reconstruction may contain more historical detail but can make it difficult for children to identify the main action. Conversely, excessive simplification can remove cultural cues. The proposed solution is controlled reduction: simplify secondary detail while protecting primary cultural signals.

4.3 Result 3: "Cute" Should Be Reframed as Approachable Visual Communication

The design process also reframes the proposed "cute" aesthetic. Rather than treating cuteness as the research contribution, the study defines the desired visual language as soft, simplified, expressive and approachable. This terminology makes the design decision analytically defensible because it links visual form to the intended audience and communication purpose.

The character should therefore use readable facial expressions, stable proportions, clear silhouettes and restrained visual detail. These choices can lower the visual barrier for children encountering unfamiliar cultural material. However, the aesthetic should not exaggerate or parody cultural clothing, ritual behaviour or religious practices. The emotional warmth should come from character expression and narrative relationships rather than from caricaturing heritage.

4.4 Result 4: Cultural Authenticity and Visual Simplification Must Be Balanced

The central tension identified by the framework is between cultural fidelity and visual accessibility. This is not resolved by maximising either side. Maximum detail can reduce accessibility, while maximum simplification can erase meaning. The proposed design principle is therefore: simplify the form, preserve the meaning.

This principle can be operationalised through a cultural-significance hierarchy. Elements with high cultural significance and high recognisability should receive strong visual fidelity. Elements with lower

cultural significance may be simplified more aggressively. Background detail can be reduced when it does not affect interpretation. This allows production resources to be concentrated on features that carry the most cultural information.

UNESCO's ethical principles are relevant here because they caution against decontextualisation and misrepresentation while emphasising community participation and respect for the dynamic nature of living heritage (UNESCO, 2026c). Cultural authenticity should therefore be understood as a process of accountable representation rather than as a claim that an animation can freeze a single version of tradition forever.

4.5 Result 5: AI Is Most Defensible as a Human-Curated Translation Tool

The fifth result is the positioning of AI within the design workflow. The framework rejects both extremes: AI is neither treated as an autonomous cultural author nor reduced to an irrelevant production shortcut. Its most defensible role is as a visual exploration instrument that operates inside human-defined cultural constraints.

This position is supported by current heritage-AI literature. Yu and Li (2026) demonstrate the importance of value-sensitive constraints in generative heritage design, while Li (2026) highlights the challenge of maintaining multimodal coherence and cultural authenticity in automated animation. Pitri et al. (2026) similarly position AI-supported storytelling as a mediating tool that requires pedagogical intentionality, cultural sensitivity and ethical oversight.

The workflow also creates a useful methodological record. By retaining prompt versions, rejected outputs and correction notes, researchers can show how cultural judgement influenced the final artefact. This is important for scholarly transparency because the final image alone cannot reveal how much human intervention was required to correct AI-generated inaccuracies.



Figure 1 Sample of design

4.6 Cultural Elements and Their Animated Representation

Table 5 Cultural-to-Visual Translation Matrix (Source: Authors' proposed design matrix; specific cultural details require final source verification.)

Cultural element	Documentary status	Animated representation	Meaning to retain	Design adaptation
Wedding attire	Requires verification for the selected community.	Character costume with clear silhouette and selected culturally significant details.	Cultural identity and ceremonial context.	Reduce textile detail while preserving distinctive features.
Ceremonial ritual	Select only practices supported by the study's sources.	Short action sequence with participant, action and consequence.	Ritual function and social context.	Condense duration without changing the represented action.
Ceremonial object	Include only documented objects relevant to selected practice.	Stylised prop integrated into action.	Function and symbolic association.	Simplify shape and texture; do not invent function.
Family/community participation	Ground in documented social relationships.	Group composition and interaction.	Collective nature of heritage practice.	Use a small number of representative characters.
Wedding environment	Use a documented or culturally plausible setting.	Simplified spatial scene.	Place and social context.	Reduce architectural/background complexity.
Food or shared activity	Include only if culturally relevant and documented.	Short scene showing social interaction.	Communal participation.	Use visual cues rather than lengthy explanation.

4.7 Narrative Structure as Cultural Learning Scaffolding

The proposed seven-scene narrative functions as a learning scaffold. The first scene answers “Where are we?”; the second addresses “What cultural background matters?”; the third introduces “Who and what are involved?”; the fourth shows “What happens?”; the fifth explains “Who participates?”; the sixth answers “Why does it matter?”; and the seventh connects the practice to “Who will carry the knowledge forward?”. This sequence moves from recognition to contextual understanding and finally to intergenerational meaning.

The structure also prevents the animation from becoming a sequence of disconnected cultural images. Every visual asset is assigned a narrative function. This responds to the concern in cultural-animation research that multimodal generation can produce fragmented narratives when visual, textual and auditory elements are not coordinated (Li, 2026).

4.8 Proposed Design Principles

Table 6 Design Principles for AI-Assisted Minangkabau Wedding Animation

Principle	Explanation	Example of application
Cultural source before visual generation	Every major cultural element should be traceable to documentary evidence or validated community knowledge.	Create a cultural reference sheet before prompting AI.
Meaning before decoration	Objects, costumes and settings should have narrative or cultural functions.	Show a ceremonial object being used rather than merely displaying it.
Simplify the form, preserve the meaning	Reduce visual complexity without removing culturally significant information.	Simplify textile patterns while retaining key costume features.
Human curation is mandatory	AI outputs are candidate material, not final cultural truth.	Reject generic or culturally implausible outputs.
Character consistency supports comprehension	Stable character design helps children follow the story.	Use a fixed character bible across scenes.
Purposeful motion	Movement should direct attention and communicate action.	Animate the central ritual action while keeping background movement limited.
Contextual narration	Cultural terms should be explained in simple language.	Use a child narrator to define a term immediately after it appears.
Document variation honestly	Local practices should not be presented as universal if sources show variation.	Use “in this community” where appropriate.
Validation before dissemination	Cultural review should occur before public educational use.	Use a structured expert checklist.
AI transparency	The research record should disclose tools, prompts, iterations and human intervention.	Maintain an AI production log.

(Source: Authors' synthesis.)

4.9 Implications for Heritage Education and Visual Communication

The framework has implications for heritage education because it treats digital media as an interpretive bridge rather than a replacement for community transmission. A school, museum or cultural institution could use the animation as an entry point before discussion with teachers, parents, elders or practitioners. This is consistent with UNESCO's position that formal and non-formal education can complement community-based transmission when communities remain involved (UNESCO, 2026b).

For visual communication research, the contribution lies in linking visual design decisions to cultural accountability. The study does not propose that cultural authenticity can be reduced to a checklist of colours, costumes or motifs. Instead, authenticity is approached through traceability: a viewer-facing visual decision should be connected to a cultural source, a design rationale and, where appropriate, validation.

For AI-assisted design, the contribution is the insertion of cultural checkpoints into a generative workflow. This shifts attention from prompt engineering alone toward evidence management, selection, rejection and correction. The designer becomes a cultural curator as well as a visual producer.

4.10 Limitations and Future Empirical Validation

The main limitation of the present study is that the proposed manuscript does not yet report empirical testing with children or a completed expert-validation panel. Consequently, claims concerning engagement, comprehension, recall or cultural appreciation remain propositions to be tested. A future study should recruit an appropriately defined child sample, obtain ethical approval and compare pre- and post-viewing measures or use a mixed-method evaluation combining observation, comprehension questions and interviews.

A second limitation concerns cultural variation. Negeri Sembilan contains multiple communities and local practices, and wedding customs may vary by locality, family and contemporary context. The animation should therefore state its documentary scope clearly. It should not present one local practice as the universal form of Minangkabau wedding heritage.

A third limitation concerns AI model behaviour. Different models may produce different representations from the same prompt, and model updates may alter outputs over time. Reproducibility therefore requires researchers to preserve prompts, source images where permitted, model/tool versions, selected outputs and human correction records.

Future research can extend the framework through expert validation, child user testing, teacher evaluation, comparative testing of human-only and AI-assisted production workflows, and longitudinal studies examining whether repeated exposure to animated heritage narratives supports recognition and discussion of cultural practices. Such studies would convert the present design framework into an empirically evaluated educational intervention.

CONCLUSION

This study positions AI-assisted animation as a contemporary mechanism for communicating Minangkabau-influenced Malay wedding heritage in Negeri Sembilan to children. Its central argument is that the challenge is not simply to digitise a wedding ceremony but to translate living cultural knowledge into an accessible visual narrative without detaching the representation from its cultural context. The proposed framework therefore begins with cultural authentication and interpretation before moving into child-oriented visual design and AI-assisted generation.

The study contributes three connected outcomes. First, it proposes a cultural-to-visual translation model in which ritual, social role, costume, object, place and meaning are explicitly mapped before animation. Second, it establishes a human-curated AI workflow in which AI generates visual possibilities, but researchers, designers and cultural validators retain responsibility for cultural decisions. Third, it formulates design principles for child-friendly representation, including the core principle “simplify the form, preserve the meaning”.

The significance of the framework lies in its refusal to treat AI efficiency as a substitute for cultural knowledge. Generative systems can accelerate visual experimentation, but they can also introduce generic, biased or inaccurate representations. The proposed workflow responds by placing documentary evidence, cultural interpretation, human curation and validation around the generative process. In this model, AI becomes a tool for visualisation rather than an autonomous author of heritage.

The study also clarifies the limits of its claims. Without completed child testing and expert validation, the framework should not be interpreted as evidence that animation automatically improves cultural awareness. Instead, it provides a structured basis for producing and evaluating such a prototype. Its next stage is therefore empirical: cultural experts should assess representation, educators should examine pedagogical clarity, and children should evaluate comprehension and engagement using ethically approved procedures.

More broadly, the proposed framework demonstrates how digital heritage research can move beyond preservation as storage toward preservation as meaningful transmission. For Minangkabau and Negeri Sembilan wedding heritage, the objective is not to freeze tradition in an idealised historical image. It is to create a carefully bounded contemporary representation through which children can encounter cultural knowledge, understand that it has meaning, and recognise that living heritage continues through people and communities.

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AUTHOR CONTRIBUTIONS

Author One conceptualised the study, developed the research framework, conducted the literature and cultural-source analysis, and prepared the manuscript. Author Two contributed to visual communication, animation design and methodological refinement. All authors reviewed and approved the final manuscript.

CONFLICT OF INTEREST

The author declares no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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