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AI-Generated Instructional Animation for Local Cultural Literacy: A Design and Development Study in Indonesian Islamic Secondary Education

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ABSTRACT

Global digital penetration has intensified a cultural literacy deficit among adolescents, including Indonesian Islamic secondary school (Madrasah Aliyah) students who increasingly engage with globalized content at the expense of indigenous heritage. This study developed and evaluated an AI-generated animation video focusing on the Karampuang Traditional House to strengthen local cultural literacy at Madrasah Aliyah Negeri (MAN) 1 Sinjai, South Sulawesi. Utilizing a Research and Development (R&D) framework, this study integrated the ADDIE model and the Multimedia Development Process (MDP). Evaluation involved expert validation from multimedia technology and cultural heritage specialists, followed by a school-based implementation trial with 104 students. Data were gathered using structured Guttman-scale questionnaires assessing perceived educational usefulness and visual attractiveness. Content expert validation yielded a perfect feasibility score of 100%, whereas media expert validation reached 83.3%, requiring minor visual refinement. Field testing revealed that 92.3% of students rated the tool as "highly beneficial" for cultural literacy, and 92.3% judged it "highly attractive," with zero negative responses recorded across both metrics. AI-generated animation, when developed via systematic instructional frameworks and rigorous validation, provides a pedagogically sound, technically viable medium for cultural education among digital natives. These findings underscore the capacity of generative AI as an innovative instrument for cultural preservation and transmission within formal Islamic education settings to effectively bridge the digital-heritage divide.

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1. INTRODUCTION

The confluence of artificial intelligence (AI), digital connectivity, and ubiquitous access to global media platforms has fundamentally reconfigured the learning landscape for contemporary secondary school students (Arcos-Cuaspud et al., 2026; Wu & Zhang, 2025). In Indonesia—as in much of the developing world—this shift has accelerated the

emergence of what is termed "digital natives": a generation that constructs knowledge primarily through visual, interactive, and networked modalities (Margono et al., 2024; Ramdhani & Wiradhany, 2023). While this digital fluency affords unprecedented access to information and creative expression, it simultaneously poses a structural challenge to cultural continuity (Widiatmaka et al., 2025). Adolescents who consume globalized digital content—including Western animation, viral social media content, and international music—often develop limited engagement with the cultural heritage embedded in their own communities (Asih et al., 2024).

This tension between digital engagement and local cultural erosion is particularly acute in the domain of formal arts and culture (Seni Budaya) education (Afiah et al., 2025; Faisal et al., 2025). In Indonesia, this subject carries a constitutionally mandated function: it serves not merely as an aesthetic elective but as a vehicle for character formation, national identity development, and the transmission of indigenous values (Agus et al., 2021; Novianti, 2022). However, the persistence of conventional pedagogical approaches—lecture-based instruction, static printed textbooks, and decontextualized examination tasks—has rendered the subject increasingly illegible to digital native learners who demand multimodal, dynamic, and personally relevant learning experiences. The resulting disengagement constitutes not simply a curriculum delivery problem but a deeper crisis of cultural literacy.

Cultural literacy, as theorized by Hirsch, encompasses the ability to understand and actively participate in one's cultural community (Bierdz, 2025; Fatiha et al., 2025). Kobakhidze and Jakavonytė-Staškuvienė (2021) extends this definition by framing cultural literacy as "value-based knowledge," a foundation for sustainable social participation and moral formation. In educational contexts, cultural literacy extends beyond the identification of cultural artefacts; it involves deep comprehension of the values, meanings, and practices that structure everyday social life (Abdulahi et al., 2024; Helda & Rose, 2025). Critically, cultural literacy functions as an anchor for identity and ethical orientation: when it erodes, young people risk losing their referential framework for understanding who they are and where they belong (Helda & Rose, 2025; Saidah et al., 2025). Orphanidou et al. (2024) further identify cultural literacy as a core 21st-century competent counterweight that prevents digitally proficient learners from becoming culturally rootless.

The crisis is demonstrably present at MAN 1 Sinjai, an Islamic secondary school (Madrasah Aliyah Negeri) under the jurisdiction of the Indonesian Ministry of Religious Affairs, Sinjai Regency, South Sulawesi. Pre-study classroom observations and semi-structured interviews with Arts and Culture teachers revealed that students exhibit markedly limited knowledge of and engagement with local cultural heritage—including the Karampuang Traditional House (Rumah Adat Karampuang), a legally protected cultural heritage site constituting one of the most architecturally and symbolically significant expressions of the indigenous culture of Sinjai Regency. While students demonstrated familiarity with global digital content, they were largely unable to articulate the historical origins, architectural symbolism, or philosophical values embedded in this local landmark. This observation is consistent with Litaay et al. (2025)

and Nuriadi (2023) documentation of the systematic underrepresentation of local cultural values in Indonesian secondary curricula, and with Angraini et al.'s (2024) evidence of declining cultural literacy indicators among Indonesian secondary school learners.

Existing scholarship points toward AI-generated animation as a promising pedagogical response to this challenge. Khoiruman (2025) demonstrated the utility of AI animation within the Indonesian Merdeka Curriculum, documenting significant learner engagement improvements in language learning. Sandra et al. (2022) developed QR code-integrated animation videos for local wisdom instruction and reported strong student comprehension outcomes. Amalia (2024) found that locally grounded animation enhanced humanistic literacy scores among elementary students, while Kusnulyaningsih et al. (2022) documented learning outcome improvements attributable to Arts and Culture animation media at the primary level. However, empirical research specifically addressing AI-generated animation for cultural heritage literacy at the Islamic secondary school level in Indonesia remains sparse—constituting a substantive gap in the existing literature that the present study addresses.

Drawing on Mayer's Cognitive Theory of Multimedia Learning—which posits that simultaneous engagement of visual and auditory processing channels enhances retention and conceptual understanding (Almasseri & AlHojailan, 2019; Mishra, 2025)—and on Hall's theorization of cultural representation as medium-dependent, this study argues that AI-generated animation video, if developed with fidelity to both instructional design principles and cultural content accuracy, can serve as an effective bridge between the digital preferences of secondary learners and the cultural literacy objectives of the national curriculum (Kellner, 2023; Sholichah et al., 2023).

This study therefore aimed to: (a) develop an AI-generated animation video for Arts and Culture instruction centred on the Karampuang Traditional House; (b) evaluate the media's feasibility through independent expert validation; and (c) assess its perceived educational usefulness and visual attractiveness among target learners through school-based field implementation. Two research questions guided the inquiry: RQ1—To what extent does the AI-generated animation video meet expert-validated standards of media quality and content accuracy? RQ2—How do students at MAN 1 Sinjai perceive the educational usefulness and visual appeal of the AI-generated animation video for local cultural literacy learning?

2. METHOD

This study employed a Research and Development (R&D) methodology, which systematically integrates empirical investigation with product creation to generate educationally validated instructional artefacts. The developmental framework integrated two complementary models: the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), which provided pedagogical coherence across all phases, and the Multimedia Development Process (MDP), which structured the technical production workflow. The integration of these models addressed the dual mandate of educational effectiveness and technical professionalism design choice informed by the

recognition that instructional media must satisfy both pedagogical and multimedia quality standards to achieve sustainable classroom adoption.

A mixed-methods approach was adopted to evaluate the developed product. Quantitative data from expert validation ratings and student response questionnaires provided measurable feasibility indices, while qualitative feedback from expert review rounds informed targeted product revisions. This convergent approach permitted triangulation of findings across multiple data types and sources.

The study was conducted at MAN 1 Sinjai, a government-operated Islamic secondary school located in Sinjai Regency, South Sulawesi Province, Indonesia. The school was selected purposively based on its representativeness of the cultural literacy challenges documented in the region and its institutional accessibility for iterative development and field testing across multiple phases. Field implementation involved 104 student respondents enrolled in Arts and Culture classes, constituting a cohort demographically and culturally representative of the intended target population. Expert validation was performed by two independent specialists: a multimedia technology expert credentialed in instructional media design, and a content specialist in South Sulawesi cultural heritage and local history.

The development followed five integrated ADDIE phases, each supplemented by corresponding MDP technical activities:

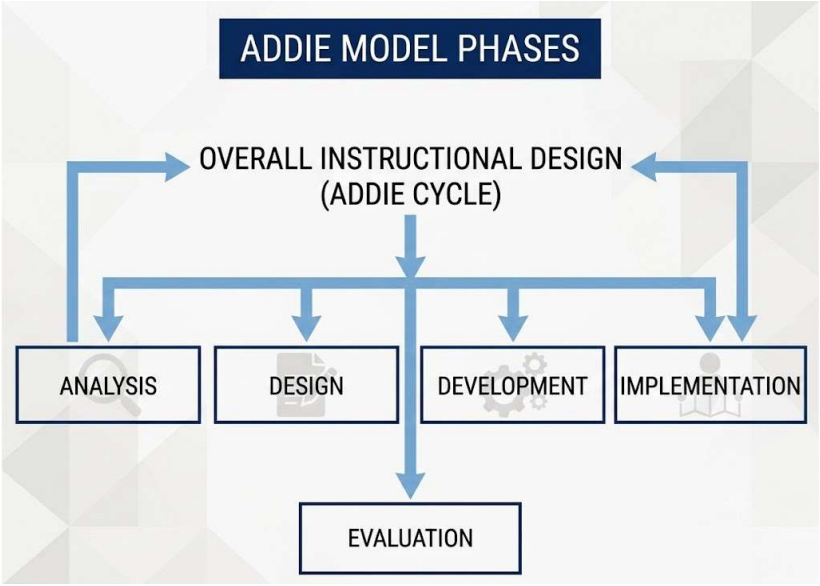

Figure 1. ADDIE phases

Phase 1 — Analysis. Needs analysis was conducted through classroom observation and semi-structured interviews with Arts and Culture teachers at MAN 1 Sinjai. Documentary review of the national Kurikulum Merdeka standards established the competency framework for media content. The Karampuang Traditional House was selected as the focal cultural object based on identified knowledge gaps and its status as a provincial-level heritage landmark with extensive documentary source materials.

Phase 2 — Design. A structured script and storyboard were developed covering four content dimensions: (a) historical origins of the Karampuang Traditional House; (b)

architectural structure and philosophical interpretations of its components; (c) embedded cultural values and their significance to the Sinjai indigenous community; and (d) the heritage site's contemporary preservation status. The storyboard served as an authoritative production blueprint, ensuring historical and cultural accuracy prior to AI-assisted visual generation.

Phase 3 — Development. Animation assets were produced using AI-based visual generation tools. AI prompts were calibrated against the storyboard to reproduce architectural details and cultural aesthetics with fidelity to source documentation. Voiceover narration in Indonesian, culturally appropriate background instrumentation, and explanatory text overlays was synchronised with the visual sequences following Mayer's (2017) principles of coherence, redundancy reduction, and multimedia segmentation. The assembled product was reviewed internally before proceeding with expert validation.

Phase 4 — Implementation. The validated media product was deployed in Arts and Culture learning sessions at MAN 1 Sinjai. Following media exposure, 104 students completed a structured questionnaire assessing perceived educational usefulness and visual attractiveness.

Phase 5 — Evaluation. Quantitative response data were tabulated and analysed as percentage distributions. Expert validation scores were interpreted against established feasibility thresholds. Revision decisions were guided by the convergence of expert qualitative feedback and field implementation findings.

Expert validation used structured rating scales across two domains: (a) media quality—assessing visual resolution, animation fluency, audio clarity, navigational structure, and interface design; and (b) content accuracy—assessing historical correctness, curriculum alignment, depth of cultural values representation, and comprehensiveness of the Karampuang Traditional House narrative.

The student response questionnaire consisted of items scaled using the Guttman scaling method, yielding hierarchically ordered categorical responses for two constructs: educational usefulness (four ordered categories: highly beneficial, beneficial, moderately beneficial, not beneficial) and visual attractiveness (three ordered categories: highly attractive, attractive, not attractive). The Guttman scale was selected for its ordinal cumulative properties, which are well-suited to measuring unidimensional attitudinal constructs with a dichotomous underlying structure, as commonly employed in evaluative educational R&D research.

Validation scores were expressed as percentage scores against maximum possible values. Student response data were analysed as frequency counts converted to percentage distributions per category. Feasibility classification followed criteria established in the Indonesian educational R&D literature: ≥81% = Very Feasible; 61–80% = Feasible with minor revision; 41–60% = Moderately Feasible; ≤40% = Not Feasible. Qualitative revision notes from expert validators were thematically analysed to identify specific product improvement targets and prioritise revision cycles.

3. RESULTS AND DISCUSSION

Results

AI Animation Video Development Outcome

The development process produced a structured AI-generated animation video approximately eight minutes in duration, organised into four sequential narrative segments corresponding to the storyboard design: (a) historical narrative of the origins and founding context of the Karampuang Traditional House; (b) architectural visualisation detailing structural components and their philosophical interpretations; (c) explication of embedded cultural values and their continuing relevance to Sinjai's indigenous community; and (d) documentation of the heritage site's contemporary condition and institutional preservation imperatives. The animation incorporated synchronised voiceover narration in Indonesian, culturally appropriate background instrumentation, and textual annotations aligned with the visual sequences in accordance with principles of multimedia learning. Following expert validation and revision, the completed product was published on an accessible YouTube channel to support both classroom and independent learning contexts.

Animation motion 1 **Animation motion 2** **Animation motion 3**

Figure 2. Animated results driven by AI prompts

Expert Validation Results

Expert validation results are summarised in Table 1. The content specialist awarded a feasibility score of 100%, confirming that the historical narrative, cultural value representation, and curriculum alignment were fully satisfactory and required no revision. The media specialist awarded a score of 83.3%, classifying the product as feasible with minor revision. Primary recommendations pertained to: (a) enhancement of visual rendering resolution for greater image sharpness on classroom projection screens; and (b) addition of an explicit, descriptive video title to aid navigational comprehension and content framing. Both revisions were implemented in full prior to field implementation.

Table 1. Summary of Expert Validation Results

Validation Domain	Score (%)	Feasibility Category	Expert Recommendation
Media Quality (Multimedia Specialist)	83.3	Feasible – minor revision required	Enhance visual rendering resolution; add descriptive and contextual video title

Validation Domain	Score (%)	Feasibility Category	Expert Recommendation
Content Accuracy (Cultural Heritage Specialist)	100.0	Very Feasible – no revision required	All content dimensions (history, values, architecture, preservation) verified as accurate; no revisions required

Field Implementation Results

Perceived Educational Usefulness

Response distributions for the perceived educational usefulness dimension, collected from 104 students, are presented in Table 2. An aggregate of 99.0% of respondents provided positive ratings (combining "highly beneficial" and "beneficial"), with 92.3% (n = 96) selecting the highest response category. No student rated the media as "not beneficial," indicating a complete absence of utility rejection across the sample.

Table 2. Student Responses: Perceived Educational Usefulness (N = 104)

Response Category	Frequency (n)	Percentage (%)	Interpretation
Highly Beneficial	96	92.3	Media highly effective for cultural literacy comprehension
Beneficial	7	6.7	Media effective; supplementary facilitation may optimise outcomes
Moderately Beneficial	1	1.0	Media functionally comprehensible but yield not fully optimised
Not Beneficial	0	0.0	No utility rejection recorded
Total	**104**	**100.0**	

Figure 3. Publication of Local Cultural Animation Videos on the YouTube Platform

Perceived Visual Attractiveness

Response distributions for the visual attractiveness dimension are presented in Table 3. All 104 respondents (100%) provided positive evaluations. A dominant majority of 92.3% (n = 96) selected the highest category as "highly attractive," with the remaining 7.7% (n = 8) selecting "attractive." No negative responses were recorded, representing a 100% positive evaluation rate across the entire sample.

Table 3. Student Responses: Perceived Visual Attractiveness (N = 104)

Response Category	Frequency (n)	Percentage (%)	Interpretation
Highly Attractive	96	92.3	AI animation meets or exceeds visual expectations of digital native learners
Attractive	8	7.7	Visual design meets student expectations with minor reservations
Not Attractive	0	0.0	No aesthetic rejection or visual disengagement recorded
Total	104	100.0	

Discussion

AI-Generated Animation as a Pedagogical Bridge for Digital Native Learners

The convergence of high visual attractiveness (92.3%) and high perceived usefulness (92.3%) ratings provides empirical support for the proposition that AI-generated animation constitutes an educationally meaningful medium for local cultural literacy instruction in digital native learner populations. These findings are consistent with Mayer's (2022) experimental evidence demonstrating that integrated visual-verbal presentation enhances conceptual understanding and with broader research documenting the motivational and comprehension advantages of animation-based learning media over conventional instruction.

A theoretically significant aspect of the present findings concerns the mechanism of learner engagement. Digital native learners, as characterized by Vitvitskaya et al. (2022), exhibit pronounced cognitive preferences for dynamic, multimodal, and rapidly sequenced informational presentations precisely embodied by the AI-generated animation format. The complete absence of negative visual attractiveness responses (0%) implies that the AI-generated aesthetics did not trigger visual dissonance, a phenomenon in which instructional materials are perceived as visually inferior to the commercial digital content students habitually consume. The use of generative AI tools appears to have functionally closed this production quality gap, enabling a small research team without professional animation resources to produce visually competitive instructional content. This is a non-trivial practical finding for most of the world's schools that operate in resource-constrained environments.

Furthermore, the present findings extend Dewey's conceptual argument about experiential learning by demonstrating that immersive, narrative-structured multimedia can generate contextual understanding of cultural practices geographically and temporally distant from students' immediate experience (Lehrer, 2024; Pederson et al., 2022). By visualising the historical trajectory, architectural symbolism, and

contemporary preservation context of the Karampuang Traditional House, the animation transformed an abstract heritage concept into a perceptually immediate and emotionally engaging learning experience—facilitating the transition from declarative cultural knowledge ("knowing about") toward deeper appreciative engagement ("understanding why").

The ADDIE–MDP Integration: Harmonising Pedagogy and Technical Production

The dual-model design architecture proved functionally productive, as evidenced by the high content validation (100%) and acceptable media quality score (83.3%). The perfect content score reflects the capacity of ADDIE's analysis and design phases to establish historical and cultural accuracy as non-negotiable preconditions before AI-assisted visual generation commences, thereby preventing the propagation of culturally inaccurate or anachronistic representations that AI generation tools—trained predominantly on globalized datasets with limited Indonesian heritage specificity—might otherwise produce. This finding has methodological significance: it demonstrates that ADDIE's front-end analysis phase is not merely a procedural formality in AI-mediated media production but a substantive quality assurance mechanism for content integrity (Anggraini et al., 2024; Rahmandhani & Utami, 2022).

The 83.3% media quality score, while above the "feasible" threshold, reveals a specific technical constraint inherent to current AI visual generation tools: outputs may be aesthetically adequate for screen-based classroom media yet insufficient for large-format projection requiring high pixel resolution. This aligns with broader observations that AI-generated educational media still requires substantial human curation and post-production intervention to meet professional instructional standards (Bozkurt, 2023; Mittal et al., 2024). The necessary expert-recommended addition of a descriptive title further illustrates the importance of systematic validation as a corrective mechanism for the inherent blind spots of technology-driven production: AI tools optimize for visual output, not for pedagogical conventions such as navigational markers, accessibility features, or curriculum-alignment signals. The ADDIE framework compensated effectively for these limitations.

Cultural Literacy Revitalisation Through Technology-Mediated Instruction

The most substantively significant implication of the field implementation data concerns the potential of AI-generated media to reverse what this study characterises as "cultural amnesia"—the progressive disengagement of young people from indigenous heritage knowledge under conditions of intense globalised media consumption. The 92.3% "highly beneficial" rating suggests that when local cultural content is reframed within a technologically native medium, it acquires a new form of cultural legitimacy for students who may previously have perceived traditional heritage instruction as aesthetically dull or contextually irrelevant.

This finding resonates with Hall's theorization of cultural representation as medium-dependent: the channel through which culture is presented shapes not only how it is understood but also whether it is deemed worthy of engagement (Banet-Weiser & Kay,

2026; Platonov, 2024). By presenting the Karampuang Traditional House through the same AI-animated aesthetic register associated with contemporary digital entertainment, the instructional product implicitly signalled the enduring value and contemporary relevance of local heritage. Students did not encounter traditional culture as museum exhibit content but as dynamic, visually sophisticated material representational shift with potentially significant long-term implications for cultural identity formation (Currie & Kelly, 2022; Dunham & Oti, 2025). The zero negative response rate reinforces this interpretation: students across the full sample found the medium both accessible and compelling, suggesting that the cultural content-digital form pairing achieved the intended pedagogical synthesis.

These findings align with the policy objectives of Indonesia's Merdeka Belajar curriculum framework, which explicitly prioritizes contextual, project-based, and character-forming approaches to learning (Naredi et al., 2025). The AI animation model developed here constitutes a concrete instantiation of these policy aspirations: it is contextually anchored in verifiable local heritage, technically accessible to school-based educators with modest resources and empirically validated for learner acceptability within the target demographic. For Arts and Culture teachers, the study also illustrates Araña-Suárez et al.'s (2022) argument that the contemporary educator must function as a "learning experience designer" curating, scripting, and deploying technology in service of curricular and cultural objectives rather than merely transmitting information.

Limitations

Several limitations of the present study require explicit acknowledgement. First, the study assessed perceived usefulness and visual attractiveness but did not incorporate objective measures of cultural literacy knowledge acquisition—such as validated pre- and post-test instruments—leaving causal inferences about actual learning outcomes unsubstantiated by the current evidence. Future studies should include psychometrically validated cultural literacy assessment tools to establish whether media exposure produces durable knowledge gains. Second, the sample was restricted to a single school in a single regency of South Sulawesi, substantially limiting the ecological and institutional generalisability of findings. Third, the evaluation horizon was confined to immediate post-exposure responses; longitudinal data on the persistence of cultural literacy engagement and identity development would strengthen the evidence base considerably. Fourth, the AI-generation tools employed produce visual outputs trained predominantly on global datasets, which may not consistently achieve the iconographic and aesthetic fidelity required for highly localised Indonesian cultural heritage representation—a limitation underscoring the indispensability of expert cultural content validation throughout all development cycles. Fifth, the absence of a control or comparison condition precludes claims of comparative effectiveness against other instructional media formats. These limitations delineate important directions for subsequent research.

4. CONCLUSION

This study developed and evaluated an AI-generated animation video for local cultural literacy instruction within the Arts and Culture curriculum at MAN 1 Sinjai, South Sulawesi, Indonesia. Integrating the ADDIE model and the Multimedia Development Process within a Research and Development design, the resulting instructional product achieved a perfect content validity score (100%) from a cultural heritage content specialist and an acceptable media quality score (83.3%) from a multimedia technology specialist. Field implementation data from 104 students showed that 92.3% rated the media as highly beneficial for cultural literacy learning and 92.3% assessed the AI-generated animation as highly attractive, with no negative responses recorded across either dimension and a 100% positive evaluation rate for visual attractiveness.

Collectively, these findings establish that AI-generated animation video, developed within a systematic instructional design framework and validated through independent expert review, constitutes a pedagogically sound and contextually appropriate medium for engaging digital native learners with local cultural heritage content in formal Islamic secondary school settings. The study contributes empirically grounded evidence to the growing body of research on the educational utility of generative AI tools and provides a replicable, procedurally transparent ADDIE–MDP integration methodology for educators and researchers seeking to develop culturally responsive instructional media.

Future research should advance these findings through: (a) incorporating pre- and post-test cultural literacy assessments to establish causal learning effects; (b) expanding implementation to multi-school, cross-regency samples to enhance generalisability; (c) conducting longitudinal evaluations of cultural identity formation among media-exposed learners; (d) undertaking comparative effectiveness studies against other instructional media formats including interactive applications and augmented reality overlays; (e) exploring multilingual and regional language narration options to serve Indonesia's linguistically diverse learner communities; and (f) engaging cultural heritage communities in iterative co-design processes to ensure AI-mediated representations achieve both aesthetic quality and community-validated cultural authenticity.

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