AI-Powered Storytelling for the Preservation of the Acehnese Language in Early Childhood Learners

Sabrina[1]*, Raina Feriska Rusyadi[2]

[1,2]Universitas Serambi Mekkah, Aceh, Jalan Tgk. Imum Lueng Bata, Desa Batoh, Kecamatan Meuraxa, Kota Banda Aceh, Provinsi Aceh, Indonesia

Keywords	Abstract
Acehnese Language; AI-Generated Storybooks; Early Childhood; Language Preservation; Local Language Maintenance ****Correspondence Email:*** *sabrina@serambimekkah.ac.id*	This study explored the potential of AI-powered storytelling tools to support early childhood learning and maintenance of the Acehnese language. As the intergenerational transmission of Acehnese continues to decline, innovative digital approaches are needed to make the language appealing and accessible to Acehnese young children. This research employed a design-based approach to develop an Acehnese storybook using AI-driven tools, namely Gemini AI and Canva. The storybook was designed to reflect Acehnese values while appealing to children's visual and linguistic interests. It was piloted in two early childhood education centers in Banda Aceh to assess their effectiveness in enhancing children's vocabulary recognition, comprehension, and engagement. Observations, language tasks, parent interviews, and teacher interviews revealed that children responded positively to the digital stories, showing improved attention, curiosity, engagement, vocabulary recognition, and emotional connections to the Acehnese language. The study highlights how such AI tools can empower educators and communities to preserve local language through creative, story-based learning. It offers a practical and scalable model for integrating AI-driven storytelling into early language education and cultural revitalization efforts in Indonesia.

1. Introduction

Indigenous languages across the world are experiencing rapid decline due to globalization, urbanization, and shifting language preferences among younger generations. UNESCO (n.d) reported that nearly 40% of the world's languages are endangered, with many facing extinction by the end of the century if intergenerational transmission continues to weaken. This trend is also evident in Indonesia, one of the world's most linguistically diverse nations, where regional and heritage languages, known as Bahasa Daerah, are increasingly overshadowed by Indonesian as the national language and global languages such as English (Cohn & Ravindranath, 2014; Putri, 2025). This does not mean that Indonesian and global languages are not important, but there must be a balance that ensures that indigenous languages are not left behind and go extinct. Among these threatened languages is Acehnese, spoken primarily in Aceh province, Sumatra Island, Indonesia. Despite its deep cultural and historical significance, the use of Acehnese among children has decreased significantly from year to year (Lusi Chairun Nisak et al., 2024), particularly in urban areas, such as Banda Aceh. Parents

frequently prefer Indonesian for social mobility and formal education, resulting in diminished domains of use for Acehnese in family settings (Idaryani & Fidyati, 2022).

In light of this, a strategy is required to revitalise local languages through technology. Digital storytelling, in particular, has been recognised as a powerful tool for supporting children's language development because it integrates texts, visuals, audio, and narrative in ways that naturally appeal to early learners (Maya & Al Halim, 2021). Advances in artificial intelligence (AI) have further expanded these possibilities, allowing educators to generate customised stories, illustrations, and learning materials tailored to local linguistic and cultural contexts. Tools such as Gemini AI, Canva, and other generative platforms are capable of producing age-appropriate texts and images in multiple languages, including minority and local languages that traditionally lack digital resources.

This study explores the potential of AI-powered storytelling as a medium for preserving and revitalizing the Acehnese language among early childhood learners. Drawing on design-based research, an Acehnese digital storybook was created using Gemini AI and Canva. The story was crafted to reflect Acehnese cultural values while appealing to children's visual and linguistic interests. The prototype was piloted in two early childhood education centers in Banda Aceh to assess its impact on vocabulary recognition, comprehension, engagement, and attitudes toward the Acehnese language. This paper reports the development process, implementation, and findings from the pilot study, contributing to ongoing discussions on how AI can support cultural preservation and early language education in Indonesia.

1.1 Literature Review

Language Endangerment and Early Childhood Transmission

The survival of a language depends heavily on its transmission to younger generations (Fishman, 1991). When children no longer learn a language as their first or dominant language, the language may become endangered. In Aceh, several studies have observed declining use of Acehnese in urban families, with younger parents preferring Indonesian at home (Idaryani & Fidyati, 2022; Lusi Chairun Nisak et al., 2024; Ramli, 2015). Early childhood is a critical period for language acquisition, and exposure to heritage languages during this stage supports both linguistic and cultural identity development (Taylor-Leech & Tualaulelei, 2021). Thus, interventions aimed at revitalizing regional languages must strategically target young learners to ensure continued transmission.

Recent sociolinguistic observations further indicate that language shift is occurring most rapidly in environments where Acehnese children are schooled exclusively in Indonesian and have limited meaningful interactions with Acehnese-speaking adults. This shift is often reinforced by parents' perceptions that Indonesian provides better socio-economic mobility, leading them to deprioritise heritage language use at home. As a result, children become passive bilinguals or, in some cases, lose comprehension of Acehnese entirely.

To counter this trend, scholars emphasise the importance of creating engaging, age-appropriate resources that encourage children to use Acehnese naturally in daily routines. Such resources must also involve parents and caregivers, as their attitudes play a central role in sustaining intergenerational transmission. When families see heritage languages as valuable, relevant, and compatible with modern life, they are more likely to create supportive linguistic environments for young children.

Digital Storytelling and Early Childhood Education

Digital storytelling has gained popularity as a pedagogical tool due to its ability to engage young learners through multimedia features, narrative sequencing, and visual storytelling. Research in early childhood settings shows that digital stories enhance vocabulary acquisition, listening comprehension, and motivation (Maya & Al Halim, 2021; Ningrum et al., 2024) Furthermore, culturally relevant stories strengthen identity formation and affirm children's sense of belonging (Chalghoum, 2024). However, many indigenous languages

lack digital storybooks, limiting opportunities for children to encounter their heritage languages in modern formats.

Digital storytelling environments also promote active participation by allowing children to interact with characters, predict story outcomes, and connect narratives to their lived experiences. This interactive dimension can be especially powerful for early learners, who often rely on visual cues and multimodal input to construct meaning. As children navigate digital stories, they develop not only linguistic skills but also digital literacy competencies that are increasingly essential in 21st century learning.

Despite these advantages, the digital divide remains a major concern in many regions. Limited access to devices, unstable internet connections, and a shortage of trained educators can hinder the effective integration of digital storytelling into early childhood classrooms. For minority and local languages, the problem is compounded by the scarcity of culturally grounded content. Therefore, targeted efforts to produce digital stories in heritage languages are crucial to ensuring equitable access and meaningful linguistic exposure for young children.

AI in Language Learning and Material Development

AI has transformed educational content creation by enabling automatic text generation, image creation, adaptive learning, and personalised storytelling. Recent studies show that AI-assisted storybooks can significantly improve children's engagement and motivation in reading due to their interactive and visually appealing formats (Istiq'faroh et al., 2025; Namaziandost & Çakmak, 2025). Generative AI tools also provide opportunities to create materials in low-resource languages (Carta et al., 2024; Koc, 2025), bypassing traditional limitations such as lack of standardised orthography or limited publishing infrastructure. Nevertheless, there is limited research on AI's role in local language preservation, particularly in early childhood contexts.

One of AI's most promising contributions is its ability to rapidly produce custom stories that incorporate children's names, interests, and cultural references. Such personalisation can increase emotional connection to the material, making heritage language learning more meaningful and enjoyable. AI-generated illustrations and audio narration can further enrich the learning experience by providing multisensory input that aligns with developmental needs.

However, concerns remain regarding quality control and cultural authenticity in AI-generated content. Without careful human oversight, AI tools may introduce linguistic inaccuracies, misrepresent cultural elements, or reinforce stereotypes. This highlights the need for collaborative development involving linguists, educators, cultural experts, and local communities. Establishing guidelines for culturally sensitive AI content is essential to ensuring that AI serves as a tool for empowerment rather than erasure.

Storytelling and Cultural Revitalization

Storytelling has long served as a cultural transmission mechanism in Acehnese society. Through tales, proverbs, and oral narratives, Acehnese elders have historically passed down moral values, local knowledge, and traditional wisdom. As oral traditions decline in modern households, integrating local stories into digital formats can rekindle children's interest in Acehnese culture. AI-powered storytelling represents a new avenue for sustaining these traditions by modernizing them without losing cultural essence.

In particular, digital and AI-enhanced storytelling can preserve the rhythm, imagery, and character archetypes unique to Acehnese folklore. When reimagined for digital platforms, traditional narratives can reach a wider audience and remain relevant in rapidly changing technological landscapes. Introducing these stories at an early age can also strengthen children's cultural identity, fostering pride and emotional attachment to their linguistic heritage.

Moreover, digital storytelling initiatives have the potential to involve communities in revitalisation efforts. Parents, teachers, and cultural practitioners can collaborate to curate stories, validate cultural themes, and

ensure authenticity in the materials produced. Such participatory approaches not only strengthen intergenerational bonds but also position storytelling as a collective responsibility. By merging technology with tradition, Acehnese communities can create sustainable pathways for cultural and linguistic preservation.

2. Research Methods

Research Design

This study employed a design-based research (DBR) approach, which integrates iterative design, implementation, and evaluation to develop practical educational interventions (Reeves, 2006). DBR is appropriate for research involving technological innovations in real-world educational settings where the goal is to design and refine solutions based on feedback from learners and educators.

Development of the AI-Powered Storybook

Two AI tools were used in this study, namely: 1) Gemini AI for generating illustrations of Acehnese settings and cultural themes; and 2) Canva for correcting the visual and linguistic inaccuracies produced by Gemini AI.

The story centered around an Acehnese family, exploring traditional customs. The Acehnese language was simplified to match the developmental level of 4-6-year-old learners. It is accompanied by Indonesian and English translations to scaffold comprehension, linking Acehnese vocabulary with more familiar Indonesian and English equivalents.

Participants and Setting

The pilot study involved two early childhood education centers in Banda Aceh, with a total of 32 children aged 4-6. Teachers and parents participated as supporting informants. Pseudonymous initials were used to maintain participant confidentiality (S01, S02, S03, and so forth for students; T01 and T02 for teachers; P01, P02, P03, and so forth for parents). Both schools reported that Acehnese was very rarely used by the children as they are more exposed to Indonesian and English languages every day, making them suitable contexts for testing the intervention.

Data Collection Techniques

Three qualitative methods were employed: 1) Observation of children's engagement, attention, and verbal responses during story presentation; 2) Language tasks involving vocabulary recognition and comprehension checks after reading, 3) Interviews with 12 parents and 2 teachers to explore changes in children's attitudes toward the Acehnese language.

Data Analysis

Data were analysed thematically following Braun and Clarke's (2006) guidelines. Observational notes, children's responses, and parent interview transcripts were coded to identify emerging patterns related to engagement, linguistic improvement, and cultural connection.

3. Result and Discussion

3.1 Children's Engagement and Cultural Relevance

Observations conducted in two early childhood centres revealed consistently high levels of engagement during AI-generated storytelling sessions. During the first reading, 29 out of 32 children (90%) maintained visual attention for more than 80% of the session, exceeding teachers' typical observations with conventional printed storybooks. Children frequently pointed at culturally familiar elements such as rumoh Aceh (traditional Acehnese house), rice fields, coconut trees, and local food, indicating strong contextual recognition.

Fig 1. Segments of AI-generated storybook introducing Acehnese language to young learners with bilingual translation support.

Spontaneous verbal responses further demonstrated emotional and cognitive engagement. For example, one child stated, "Rumahnya kayak rumah nenek di kampong!" (S01), while another commented, "Ada sawah… kayak di kampung!" (S02). Such culturally grounded reactions were recorded nine times across two sessions. Teachers also reported increased participation among children who were typically passive, suggesting that localized AI-generated visual narratives foster stronger emotional connection and attentional engagement compared to standard learning materials.

These findings indicate that culturally relevant AI-generated stories are effective in enhancing children's engagement and contextual learning, supporting the importance of local representation in early childhood educational media.

3.2 Vocabulary Recognition and Emerging Language Use

Immediate post-story assessments indicated meaningful short-term vocabulary acquisition. From 15 target Acehnese words introduced, the average recognition rate reached 72.5%, which is notable given the limited daily use of Acehnese among participants. Concrete nouns such as mak (mother), bapak (father), rumoh (house), jamee (guest), blang (rice field), and langet (sky) were more easily recognized, whereas abstract terms such as raseuki (blessing) were less frequently identified. This pattern aligns with common trends in early childhood vocabulary development.

In addition to recognition, several children began producing short Acehnese utterances during follow-up activities. For example, one child stated, "Nyoe rumoh." (S01), and another attempted, "Lon jak bak rumoh nek!" (S02). Teachers reported that children demonstrated higher recall and greater willingness to attempt speaking Acehnese compared to previous lessons. These findings suggest that AI-generated storytelling supports not only receptive vocabulary development but also early productive language use.

3.3 Emotional Connection, Identity Formation, and Stakeholder Perceptions

Interviews with parents and teachers revealed a positive shift in children's emotional connection to the Acehnese language. Several parents reported that children requested repeated exposure to the story at home and began using simple Acehnese expressions such as Nyoe pue? ("What is this?"), Peu haba? ("How are you?"), and Haba get ("I am fine"). These behaviors indicate emerging familiarity and identity engagement with the heritage language.

Teachers expressed strong approval of the AI-generated materials, emphasizing that the illustrations increased classroom engagement and that bilingual support facilitated comprehension. Parents similarly described the digital storybook as attractive, modern, and important for preserving the Acehnese language. Notably, some

parents observed that the story made Acehnese "look cool," suggesting a shift in perception from a language associated with older generations to one perceived as enjoyable and relevant for children.

Taken together, these findings demonstrate that AI-powered culturally grounded storytelling not only enhances engagement and vocabulary learning but also contributes to emotional attachment and early identity formation.

The results confirm previous studies showing that digital storytelling can enhance motivation, vocabulary development, and comprehension (Maya & Al Halim, 2021; Ningrum et al., 2024), while extending this evidence to the context of minority language revitalization. The strong emotional engagement observed supports Chalghoum's (2024) argument that culturally meaningful content plays a critical role in identity development and language pride.

Moreover, the findings highlight the practical potential of AI tools in producing localized learning materials efficiently. However, the need for human oversight remains essential, particularly to ensure linguistic accuracy and cultural authenticity in low-resource languages such as Acehnese. Therefore, AI-generated storytelling should be positioned as a supportive, culturally responsive tool that complements—rather than replaces—community knowledge and pedagogical judgment.

4. Conclusions

This study demonstrates the potential of AI-powered storytelling to support early childhood acquisition and preservation of the Acehnese language. Children responded positively to the AI-generated stories, showing improved vocabulary recognition, comprehension, and engagement. Parents and teachers also recognised the value of integrating culturally relevant digital stories into early educational settings.

Future research may involve larger samples, longitudinal observation, and integration of interactive AI features such as voice narration, conversational agents, or augmented reality (AR). As technology continues to advance, AI-powered storytelling provides a promising pathway for revitalizing local languages and strengthening cultural identity among young learners in Indonesia and beyond.

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