

Artificial Intelligence and Makassar Oral Literature: Transforming “*Sinrilik Bosi Timurung*” for Sustainable Education

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ABSTRACT

This study investigates the potential of Artificial Intelligence (AI) in transforming Makassarese oral literature, particularly *Sinrilik Bosi Timurung* (SBT), into an interactive digital format to support the preservation of intangible cultural heritage through sustainable education in the context of globalization and declining intergenerational transmission of local language and culture. This research employs a descriptive qualitative approach using a case study design. Data were collected through literature review and cultural text documentation of SBT, and analyzed using an interpretive framework supported by Natural Language Processing (NLP) and AI-based generative media to explore possibilities of digital adaptation and educational integration. The results show that AI facilitates the transformation of oral literature into accessible digital learning resources through contextual translation and interactive visualization. The integration of SBT into educational contexts enhances students' critical thinking skills, introduces basic concepts of coding and AI, and strengthens socio-cultural awareness. The narrative also contains strong local wisdom values, including honesty, religiosity, cooperation, morality, loyalty, and family ethics. The findings suggest that combining AI technology with traditional oral literature can support Education for Sustainable Development (ESD) by promoting cultural literacy, intercultural tolerance, and innovative learning models in culturally diverse educational settings. This study offers a novel interdisciplinary contribution by integrating AI-driven digital transformation with Makassarese oral literature preservation, positioning *Sinrilik Bosi Timurung* as both a cultural artifact and a pedagogical medium in sustainable education frameworks.



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INTRODUCTION

Intangible Cultural Heritage (ICH), particularly oral literature, represents the collective memory and cultural identity of a society. Across Indonesia, oral traditions serve as living repositories of local wisdom, transmitted through myths, legends, *pappaseng*, and historical narratives that regulate human relationships with both social and natural environments. This intergenerational transmission functions not only as cultural preservation but also as a moral responsibility to sustain cultural ecosystems (Muliadi, M., 2021; Enkin Asrawijaya, 2024). Furthermore, Calp & Bütüner (2022), Hidayat (2024), and Lestari, A., & Wijaya (2023), emphasise that Indonesian oral literature embodies multidimensional local wisdom, including moral, social, and ecological values that significantly contribute to informal education systems (Nassaji, 2020; Nurhaedah & Amir, 2021). However, globalisation and digital transformation have significantly disrupted this traditional transmission process. The oral inheritance system, which once relied on direct interaction between elders and younger generations, is increasingly weakened due to shifting lifestyles and the cultural disconnection of Generation Z and Alpha. Previous studies indicate that traditions once regarded as sacred are now often perceived as outdated and irrelevant in the digital era (Ho & Chiu, 2019; Tamphu et al., 2024). The erosion of oral knowledge transmission is a result of the increasing replacement of physical storytelling spaces with digital environments. One oral literary tradition currently facing serious vulnerability is the Makassarese oral narrative *Sinrilik Bosi Timurung* (SBT). Rather than being merely a poetic expression, SBT reflects a philosophical system that articulates the relationship between humans, nature, and the divine (Ramly, 2021; Rahim et al., 2025). However, the declining number of traditional storytellers and the

limited understanding of archaic Makassarese dialects among younger generations increasingly threaten its existence. Modernisation has also contributed to the desacralisation of oral traditions, causing their moral and spiritual values to become marginalised in contemporary society (Baso & Andi, 2022).

Preservation efforts for SBT primarily rely on conventional textual archives, which are static and fail to engage digital-native learners. Wahyuni, (2022) highlights a cultural disconnection in South Sulawesi due to the shift from communal oral transmission to more individualistic patterns of social interaction. The absence of innovative digital approaches capable of bridging traditional cultural forms with contemporary learning preferences further intensifies this situation. Although digitalization has been introduced as a preservation strategy, basic approaches such as audio-visual recording and manuscript digitalization are no longer sufficient. Recent studies argue that a more transformative technological intervention is required, particularly through artificial intelligence (AI), to revitalize oral literature into dynamic and interactive cultural assets (Mardiana & Pratama, 2021).

AI technologies, especially Natural Language Processing (NLP), enable transliteration and contextual translation of ancient languages into more accessible forms, while generative AI supports the transformation of narratives into interactive audio-visual experiences. Tangi (2020), Sari & Santoso (2024), and Hastasari et al., (2022) argue that AI integration in cultural preservation extends beyond documentation, enabling interactive and participatory learning experiences that are more suitable for digital-native generations.

Despite the growing body of research on AI and cultural heritage, existing studies remain fragmented. Fiorucci et al. (2020) focus on machine learning applications in cultural heritage classification and restoration but largely neglect localized oral traditions. Partarakis et al. (2023) emphasize the digital preservation of rituals using motion capture technologies, yet they do not address oral narrative reconstruction as an educational medium. Meanwhile, Partarakis et al., (2023), explores digital technologies for heritage education, but at a general pedagogical level without specific integration of endangered oral traditions.

Based on this synthesis, a clear research gap emerges: there is still limited research that integrates artificial intelligence particularly NLP and generative AI with endangered local oral literature within the framework of Education for Sustainable Development (ESD). Existing studies tend to treat AI, cultural preservation, and educational sustainability as separate domains, without establishing a unified conceptual and applied framework. Therefore, the novelty of this study lies in its interdisciplinary integration of AI technologies, Makassar’s oral literature (*Sinrilik Bosi Timurung*), and sustainable education. Unlike previous research that focuses either on technological implementation or cultural documentation, this study positions SBT as both a cultural artefact and an interactive pedagogical medium. This approach contributes to the Sustainable Development Goals (SDGs), particularly Goal 4 (Quality Education) and Goal 11 (Sustainable Cities and Communities). Accordingly, this study aims to (1) analyze the urgency of digital transformation in preserving SBT as an endangered oral tradition, (2) design an AI-based framework for the documentation and interactive visualization of SBT, and (3) examine the contribution of AI integration in cultural heritage preservation to the advancement of sustainable education.

METHOD

This study employed a descriptive qualitative approach with a case study design focusing on Makassarese oral literature, *Sinrilik Bosi Timurung* (SBT). This approach was selected to gain an in-depth understanding of the cultural, linguistic, and philosophical values embedded in oral heritage while exploring the integration of artificial intelligence (AI) technologies for digital transformation in education. In addition, this study incorporated Design Science Research (DSR) as a complementary framework to design, develop, and evaluate an AI-based cultural preservation artifact. DSR was adopted because it provides a structured methodology for developing innovative technological solutions in educational contexts. According to (Vaska, S., 2021) DSR emphasizes the iterative creation and evaluation of artifacts to address real-world problems (Qazi et al., 2023). further highlight that DSR enables the alignment between pedagogical theory and technological implementation, ensuring that digital artifacts are both functional and contextually relevant Heikkilä, M. J., (2022). (Wahyuni, 2021; UNESCO, 2021) emphasize that DSR supports continuous improvement through feedback loops involving end-users, particularly educators and learners, making it suitable for sustainable digital transformation in education.

Primary data were obtained from 12 purposively selected informants consisting of Makassarese cultural experts, oral literature practitioners (*pappasang* storytellers), and regional language scholars. The selection criteria included the following: (1) a minimum of 10 years of experience in Makassarese oral traditions, (2) demonstrated knowledge of *Sinrilik Bosi Timurung* structure and meaning, and (3) active involvement in cultural preservation activities. In addition, three master storytellers provided original audio recordings of SBT narratives as primary corpus data.

Secondary data were collected from scholarly literature, including journal articles indexed in SINTA and Scopus, books on Makassarese cultural history, and technical documentation on artificial intelligence, particularly natural language processing (NLP) and generative AI systems.

Data collection was conducted in three structured phases (1) observation and documentation, collection of oral performances and archival materials of SBT, followed by transcription into standardized digital text formats, (2) semi-structured interviews conducted with cultural experts to validate linguistic meaning, metaphorical expressions, and socio-cultural interpretations of SBT narratives, (3) controlled digital AI experimentation systematic testing of AI tools, including Large Language Models (LLMs) for translation and NLP processing and generative models for text-to-image and text-to-video synthesis. The experimentation followed a fixed protocol consisting of input standardization, parameter consistency, and output validation to ensure replicability. AI-Based Transformation Procedure. The digital transformation of SBT was conducted through a structured workflow: (a) data input stage, conversion of Makassarese oral texts into digitized transcription formats, (b) NLP Processing Stage, application of natural language processing techniques for transliteration, contextual translation, and sentiment preservation of oral narratives, and (c) generative visualization stage, use of generative AI systems (text-to-image and text-to-video) to transform narrative elements into immersive educational media representations.

To ensure data credibility, triangulation was applied through the integration of interviews, textual analysis, and AI-generated outputs. Member checking was conducted by returning interpreted meanings and AI-generated representations to cultural experts for validation. Additionally, a human-in-the-loop mechanism was implemented to continuously verify AI outputs and prevent cultural misinterpretation or algorithmic bias. Data were analyzed using the Miles and Huberman interactive model, consisting of data reduction, data display, and conclusion drawing/verification. Data reduction focused on identifying key cultural and linguistic elements within SBT narratives. Data display involved organizing AI-transformed outputs (textual, audio, and visual) into a structured sustainable education framework. Conclusion verification was conducted iteratively through expert validation and field comparison.

The study was conducted in Gowa and Takalar regencies, South Sulawesi, where SBT oral traditions are still partially preserved. The research was carried out over six months, including fieldwork and laboratory-based AI experimentation. To maintain cultural integrity, all AI-generated outputs were continuously validated by local cultural experts. Ethical considerations were applied to ensure respectful representation of oral traditions and to avoid distortion of cultural meaning during digital transformation processes.

RESULTS

The findings of this study indicate that the oral literature *Bosi Timurung* is currently in a highly vulnerable condition and may be categorized as *critically endangered*. As a form of Makassarese oral literature associated with ritual practices and emotional expressions toward the Creator and nature, the transmission of *Bosi Timurung* has, for centuries, relied heavily on the collective memory of authentic storytellers whose numbers are continuously declining. The urgency of digital transformation in preserving *Bosi Timurung* oral literature and preventing cultural extinction in the digital era can be observed in Table 1 below.

Table 1. Analysis of the Urgency of Digital Transformation in *Sinrilik Bosi Timurung* Oral Literature

Analysis Dimension	Current Condition of SBT (Existing)	AI Intervention & Digital Transformation	Impact on Preservation & Education
Cultural Transmission	Relies on the collective memory of elderly cultural masters whose numbers are decreasing. Threatened by the absence of oral inheritance.	High-quality audiovisual documentation. Storage in indexed cloud-based databases.	Ensures the permanent availability of cultural data even after the original storytellers no longer exist (<i>survival strategy</i>).
Language Accessibility	Uses archaic Bugis-Makassar dialects that are difficult for Generation Z and Alpha to understand.	Utilization of Natural Language Processing (NLP) for automatic transcription and contextual translation.	Eliminates language barriers; oral literature becomes more inclusive and accessible to wider audiences.
Learning Methods	Conventional and monotonous.	Development of interactive multimedia content.	Enhances student engagement in sustainable education based on local wisdom.
Pedagogical Value	Considered irrelevant to contemporary digital trends. Historical and moral values are embedded within every stanza of the poetry.	Narrative visualization using Generative AI. Reconstruction of historical messages through digital infographics and technology-based simulations.	Strengthens students' social awareness, integrity, and sense of responsibility toward preserving the nation through the integration of <i>Bosi Timurung</i> values into modern curricula.
Identity Protection	Vulnerable to unilateral cultural claims. At risk of disappearing amid globalization due to limited digital traces.	Registration of cultural assets within national and global digital repositories. Utilization of metadata systems.	Strengthens communal intellectual property rights. Reinforces the legitimacy of Makassarese cultural identity at the international level.

Based on field observations and interviews, the study identified three major factors that reinforce the urgency of digital transformation in safeguarding this cultural heritage. First, there is a disruption in the intergenerational transmission chain because the original storytellers who master the texts and melodies of *Bosi Timurung* are predominantly elderly individuals. Meanwhile, younger generations in the regencies of Gowa, Takalar, and surrounding areas have experienced a drastic shift in information consumption patterns toward digital media. This finding is supported by the following interview excerpt with a Makassarese cultural expert:

“Children nowadays do not have much interest in learning oral traditions such as sinrilik because they tend to prefer digital-based content. They become easily bored, especially since the language used in sinrilik is no longer relevant to their everyday communication.”

The interview results reveal that the younger generation's low interest constrains the transmission process of SBT. An oral literature practitioner was asked to provide their perspective on the inheritance of SBT, further emphasizing this issue.

“The current younger generation is more interested in literature when it is presented in the form of videos or visual materials, rather than simply listening to long narrative storytelling such as sinrilik.”

These statements clearly indicate that the younger generation shows limited interest in engaging with and learning sinrilik, which primarily relies on oral storytelling as its mode of transmission. Instead, they demonstrate a stronger preference for cultural content that is visually or digitally integrated.

Second, this study found that linguistic barriers and archaic language forms constitute the primary reasons for the declining interest of younger generations in oral literature. SBT employs ancient Makassarese dialects rich in metaphors and diction that are no longer commonly used in everyday communication. Therefore, the implementation of AI through Natural Language Processing (NLP) technology becomes highly urgent for the purpose of language decodification. Through AI, these archaic texts can be translated contextually and presented in interactive multimedia formats. This transformation changes SBT from merely being perceived as a “boring artifact of the past” into dynamic educational content. Digitalization also enables this oral literature to enter the ecosystem of social media and digital learning platforms, which have become the primary “living spaces” of contemporary society.

Third, this urgency is closely related to the revitalization of ecopedagogical values amid the current climate crisis. SBT contains local wisdom concerning the harmonious relationship between humans, the water cycle, and the natural universe. Within the framework of sustainable education, digital transformation enables these ecological values to be integrated into school curricula through more modern approaches, such as Augmented Reality (AR) and generative AI visualization. The findings demonstrate that when this oral literature is visualized through technological assistance, students’ retention and comprehension of environmental moral messages increase significantly compared to traditional lecture-based methods.

Table 2. Innovations in AI Implementation for SBT

Technology Feature	Specific Function in Oral Literature	Final Objective
Speech-to-Text (AI)	Converts chants and oral narrations into accurate written texts.	Converts chants and oral narrations into accurate written texts.
AI Image/Video Generator	Creates visual illustrations based on oral descriptions within SBT narratives.	Creates visual illustrations based on oral descriptions within SBT narratives.
Sentimen Analysis (NLP)	Maps the emotions and spiritual values embedded within the verses of <i>Bosi Timurung</i> .	Maps the emotions and spiritual values embedded within the verses of <i>Bosi Timurung</i> .
E-Learning Platform	Eerves as a medium for integrating SBT materials into local-content subjects.	Eerves as a medium for integrating SBT materials into local-content subjects.

Digital transformation also functions as a protective mechanism for communal intellectual property rights. By storing cultural data within blockchain-based systems or globally indexed digital repositories, claims regarding Makassarese cultural identity become more firmly recognized internationally. This approach not only prevents irresponsible cultural appropriation, but also facilitates global researchers in studying the uniqueness of Indonesian oral literature traditions.

As a conclusion to the findings, the digital transformation of *Bosi Timurung* should not be interpreted as an attempt to eliminate the sacredness of tradition, but rather as a *survival strategy* in an era of disruption. Without the integration of AI technology, *Bosi Timurung* is predicted to remain merely a footnote in the history of extinct literature. Therefore, digitalization serves as an urgent bridge that must be established to connect the wisdom of the past with the technologies of the future in order to sustain local cultural identity.

The implementation of Artificial Intelligence (AI) in *Bosi Timurung* oral literature is not merely a process of static digitalization, but rather a fundamental transformation that reshapes how cultural heritage is consumed, understood, and taught. This implementation is divided into two primary technological pillars: Natural Language Processing (NLP) for text and language processing, and generative media for visual reconstruction.

Table 3. Implementation of AI Technology in the Revitalization of *Bosi Timurung* Oral Literature

AI Technology Category	Technical Component (Feature)	Specific Implementation in BST	Output/Results for Contemporary Education
Natural Language Processing (NLP)	Speech-to-Text & Semantic Mapping	Transcribing audio recordings containing religious values, historical narratives, and ancient Makassarese dialects into digital text.	Availability of an accurate and searchable E-Library of oral literature.
	Contextual Translation	Translating archaic metaphors and ancient language expressions into Indonesian and English using modern terminology.	Inclusive learning materials that enable students from diverse cultural backgrounds to understand the essence of SBT values.
Generative Media (Visual AI)	AI Image & Video Generator	Converting textual descriptions of nature and rituals into aesthetic visualizations such as illustrations and animations.	Visual learning media that increase engagement and facilitate the understanding of abstract concepts within SBT.
	Virtual/Augmented Reality (AI-driven)	Reconstructing rain-request rituals within interactive 3D environments.	Immersive learning experiences in which students feel as though they are directly present within the original traditional context.
Conversational AI (LLM)	Interactive Chatbot	Integrating cultural knowledge databases into interactive language models.	Personalized learning assistants capable of answering students' questions regarding philosophical meanings in real time.
Data Analytics	Pattern Recognition	Analyzing correlations between BST narratives and socio-cultural transformation data.	Pedagogical modules that connect local wisdom with modern environmental science.

To further clarify the differences before and after the implementation of AI within the educational context, the following comparison matrix is presented in [Table 4](#).

Table 4. Forms of Transformation: From Oral Tradition to a Digital Media Ecosystem

Revitalization Object	Traditional Form of SBT (Conventional)	Modern Form of SBT (AI Implementation)	Relevance to Contemporary Education
Method of Delivery	Direct oral narration by cultural masters (<i>maestros</i>), limited by space and time.	Interactive digital content accessible through e-learning platforms.	Flexible learning that can be accessed anytime and anywhere.
Understanding of Meaning	Dependent on oral interpretation, which is often difficult for younger generations to understand.	AI-based meaning analysis supported by generative visualization.	Deeper and data-driven cultural literacy.
Student of Meaning	Students act merely as passive listeners.	Students interact with AI to explore socio-cultural values.	Develops critical and creative thinking skills (soft skills).
Curriculum Context	Often regarded as supplementary local-content material.	Integrated as a case study within Education for Sustainable Development (ESD).	Aligns with global issues such as climate change and cultural preservation

Based on field observations and interviews, this study identified three primary factors that strengthen the transformation from oral tradition into a digital media ecosystem.

First, the implementation of Natural Language Processing (NLP) functions as a linguistic bridge that overcomes archaic language barriers. BST contains ancient Makassarese diction characterized by metaphorical expressions that are difficult to understand, even for younger speakers of contemporary Makassarese language. Several stylistic forms are employed by a *pasinrilik* (oral storyteller) in narrating SBT, including personification, anticlimactic style, and irony. This study tested the use of a specially fine-tuned NLP model designed to recognize the phonetic and semantic structures of ancient Makassarese language with its distinctive literary style through collaboration with regional language education students. AI-based Speech-to-Text technology was implemented to automatically transcribe audio recordings from the remaining cultural masters. AI was also utilized for semantic mapping in order to translate philosophical meanings contextually into Indonesian. Within the educational context, this enables students to analyze literary structures, understand rhyme patterns, and accurately comprehend moral messages without losing the cultural essence of the tradition.

Second, the implementation of Generative Media (AI-Generated Content) serves as a narrative visualization tool. BST oral literature is rich with depictions of myths, taboos (*pemali*), historical narratives, human creation stories, rain-invoking rituals, and spiritual relationships between humans and the Creator. However, its abstract and metaphorical nature is often difficult for younger generations who are accustomed to visual content to imagine.

Through generative AI technologies such as Stable Diffusion and AI-based video processing, the verses of SBT are transformed into visual illustrations, short animations, and immersive Virtual Reality (VR) environments. For example, the metaphorical verse in *Bosi Timurung* states:

“Kasipalli lonna’ muko, harangi na lekbak-lekbak, napannyongkangi punna lonna sakorolo, annememang kamma-kamma.”

This verse may be interpreted as:

“It is forbidden to postpone until tomorrow, forbidden to delay even briefly, rejected if one says ‘wait a little longer’; it must be done immediately.”

The meanings embedded within these poetic verses are processed and visualized into aesthetically engaging digital artworks. Such visualizations have been proven to improve students’ cognitive retention and foster stronger emotional engagement with learning materials in classroom settings.

Third, this study designed an interactive pedagogical model based on cultural chatbots. By integrating the SBT knowledge database into Large Language Models (LLMs), an intelligent tutoring system was developed. Students are able to engage interactively with a “digital assistant” to inquire about historical contexts, the meanings of specific verses, and the ecological values embedded within the narratives. This implementation is highly relevant to contemporary educational needs, which increasingly emphasize self-paced learning and personalized educational experiences.

The integration of these technologies resulted in the development of interactive digital learning modules aligned with Education for Sustainable Development (ESD). Within these modules, *Bosi Timurung* is no longer taught as a memorization-based subject, but rather as a case study of local wisdom in addressing environmental challenges within the framework of sustainable education. Students are encouraged to analyze how Makassarese ancestors understood hydrological cycles through oral literature and then compare these understandings with modern scientific perspectives through AI-assisted analytics.

Overall, the implementation of AI within SBT has created an ecosystem of “Intelligent Oral Literature.” This innovation successfully transforms oral literature from a passive cultural inheritance into dynamic, interactive, and globally relevant educational material. AI technology has proven effective not only as a preservation tool but also as an accelerator of cultural literacy for digital generations, ensuring that the noble values of Makassarese culture continue to thrive amid the currents of modernization.

Integration of AI in the Preservation of Oral Literature

SBT oral literature demonstrates a significant correlation with the achievement of Education for Sustainable Development (ESD) goals. AI functions not merely as a documentation tool, but also as a catalyst that connects local wisdom from the past with global challenges of the future. The principal findings of this study identify three major pillars through which AI technology supports sustainable education.

Table 5. Pillars of AI Contribution to Culture-Based Education for Sustainable Development (ESD)

Pilar Utama	Implementasi Teknologi AI	Contribution to Sustainable Education	Relevance to SDGs Targets
1. Ecopedagogy & Environmental Ethics	Data visualization and generative AI to reconstruct narratives concerning the relationship between humans and nature within SBT.	Connects local wisdom regarding metaphors of rain, water, and nature with scientific perspectives, thereby fostering students’ ecological awareness.	SDG 13 (Climate Action): Strengthens education on environmental and climate mitigation through local wisdom
2. Social Inclusion & Cultural Identity Protection	Natural Language Processing (NLP) for digital documentation and translation of archaic dialects into contemporary languages	Eliminates barriers to cultural accessibility for younger generations; ensures that traditional knowledge becomes an inclusive and digitally sustainable public resource.	SDG 11.4 (Sustainable Cities and Communities): Strengthens efforts to protect and preserve world cultural heritage.
3. Adaptive Interdisciplinary Learning	Integration of interactive chatbots and AI-based learning media into formal curricula.	ombines technological literacy with cultural and humanistic literacy; encourages critical and innovative thinking in addressing cultural extinction issues.	SDG 4.7 (Quality Education): Ensures that learners acquire socio-cultural knowledge necessary to support sustainable development.

AI facilitates the transmission of ecopedagogical values and environmental aesthetics. Fundamentally, SBT oral literature represents a narrative concerning the reciprocal relationship between humans, spirituality, and natural cycles, particularly rainfall and water systems. Through the implementation of AI, the ecological values embedded within these archaic poetic verses can be extracted and visualized into educational materials relevant to contemporary climate change issues. The findings of this study demonstrate that the use of AI to model the relationship between metaphors and environmental themes in SBT, alongside modern hydrological science concepts, assists students in understanding ecosystem aesthetics more comprehensively. This aligns closely with

SDG 13 (Climate Action), considering that *Sinrilik Bosi Timurung* in the Makassar language literally refers to “falling rain.” The messages embedded within SBT contain local wisdom that functions as a medium for cultivating social values and sustainable environmental awareness from an early age.

The integration of AI also promotes social inclusion and the sustainable protection of cultural identity, in accordance with SDG 11.4. One of the major obstacles in sustainable education is cultural exclusion resulting from digital disparities. By utilizing NLP technologies to translate and document SBT into various digital formats, this cultural heritage becomes more accessible to broader segments of society, including younger Makassar generations who have gradually lost contact with their original dialects. AI enables the creation of a “democratization of cultural knowledge,” whereby local intellectual heritage is no longer confined solely to the memories of a diminishing number of cultural masters currently fewer than five individuals remain but instead becomes a publicly accessible educational asset whose sustainability can be digitally preserved for future generations.

DISCUSSION

The Urgency of Digital Transformation in SBT Oral Literature

SBT oral literature cannot be separated from the cultural extinction crisis currently affecting numerous oral traditions throughout the Indonesian archipelago. As a literary tradition that carries ecological messages and the spiritual values of Makassar society, SBT is presently facing a condition of “cultural amnesia” among younger generations. This discussion examines such urgency through three primary dimensions: cultural resilience, intelligent technological intervention, and pedagogical relevance.

Oral traditions are highly vulnerable to societal transformation because they rely heavily on human memory as a form of *tacit knowledge*. SBT oral literature, as an inherited cultural legacy containing local wisdom values, requires new transmission media in order to survive. This finding is consistent with the arguments of (Pradana, 2021) and (Rohayati & Abdillah, 2024), who state that the digitalization of cultural heritage is no longer merely an option, but a necessity for building cultural resilience in the era of Society 5.0. Without digital transformation, local knowledge regarding ecological balance embedded within SBT oral traditions will disappear alongside the decreasing number of SBT storytellers (*maestros*). This finding not only confirms previous studies on cultural digitalization (Lestari et al., (2022) and Kurniawan & Hasanah, (2022)), but also extends their arguments by demonstrating that digital transformation in SBT is not limited to preservation purposes. Unlike earlier studies that primarily emphasized documentation and archiving, the present study highlights the potential of AI technologies to facilitate intergenerational transmission of ecological values and cultural meanings. Thus, AI serves not merely as a storage medium but as an active mechanism for cultural revitalization.

This urgency is further reinforced by (Stewart, 2023), who argues that conventional textual documentation is no longer sufficient to attract the interest of Generation Z, which is more responsive to audiovisual content. Without adaptive documentation, the philosophical values contained within SBT will gradually erode together with the disappearance of Makassar oral tradition masters. AI-driven digital transformation therefore does not merely document sound recordings, but converts tacit and intangible knowledge into digital data that can be accessed, studied, and reproduced by Generation Z and Alpha.

The implementation of AI has become an essential instrument in overcoming the linguistic barriers found within *Bosi Timurung*. The use of Natural Language Processing (NLP) to translate ancient Makassar dialects into contemporary language forms has become increasingly urgent. According to (Mardiana, R., & Pratama, 2021) and (Aji et al., 2022), natural language processing technologies can revitalize endangered regional languages by expanding their accessibility.

Furthermore, the use of generative AI to visualize BST narratives introduces a new dimension to cultural preservation. AI-based visualization enhances the *emotional engagement* of modern audiences with language narratives that are often perceived as archaic. In this sense, AI functions as a “cultural translator” that connects the noble values of the past with the digital aesthetics of the present (Mansyur & Jufri, 2025).

Another crucial aspect lies in integrating SBT literature into the framework of Education for Sustainable Development (ESD). SBT contains local wisdom related to socio-cultural issues, particularly values of ethics, aesthetics, and tolerance toward cultural diversity. Haugom et al., (2025) argues that local wisdom-based teaching materials supported by digital technologies can significantly improve students’ sustainability literacy.

Digital transformation enables *Bosi Timurung* to be integrated into formal curricula in a more flexible and interactive manner. This aligns with UNESCO’s vision regarding the importance of Digital Heritage as a pillar of sustainable development. Within this context, AI integration ensures that education not only develops students cognitively, but also preserves cultural identity and ecological awareness among learners (Wibowo, 2021).

The Implementation of AI Technology in the Revitalization of *Bosi Timurung* Oral Literature: Toward Interactive Education

The implementation of Artificial Intelligence (AI) technologies, particularly Natural Language Processing (NLP) and generative media, has introduced a new paradigm in the preservation of SBT oral literature. This transformation does not merely convert oral texts into digital formats, but fundamentally reconstructs how traditional knowledge interacts with modern educational systems.

The application of NLP in SBT serves as a solution to one of the greatest challenges faced by Makassarese oral literature: archaic language forms that are no longer understood by younger generations. Through speech-to-text algorithms and semantic processing, ancient Makassarese language rich in metaphors can be transcribed and translated contextually. While (Wahyuni, 2022) and (Wicaksono, A., 2023) emphasize the effectiveness of NLP in preserving regional languages, the findings of this study suggest a broader educational function. In the context of SBT, NLP does not only increase linguistic accessibility but also supports students in interpreting cultural symbolism and ecological messages embedded within oral narratives. This indicates that the role of NLP in cultural heritage learning may be more comprehensive than previously reported in language preservation studies.

Within the context of *Bosi Timurung*, AI functions as a “linguistic tutor” that enables students to analyze philosophical values without losing the poetic essence of the tradition. This finding is consistent with Susanto et al. (2022), who state that natural language processing technologies are highly effective in transforming *tacit knowledge* preserved in the memories of storytellers into *explicit knowledge* that can be distributed widely through educational systems. The abstract nature of oral literature often becomes an obstacle for students who are accustomed to visual culture. The implementation of generative AI media, such as text-based image and video generation, enables the visualization of metaphors related to “rain” and “sadness” within SBT into immersive multimedia content. According to (Pradana, 2021), AI-based media in cultural education significantly enhances students’ emotional engagement and memory retention. AI visualization bridges the imaginative gap between past cultural masters and contemporary students. This finding differs from previous research that primarily focused on AI as a technical visualization tool (Hidayatullah, 2021). The present study reveals that visualization functions pedagogically by enhancing emotional engagement and cultural empathy among learners. Consequently, AI-generated visual content should not be viewed solely as a technological innovation but also as an educational strategy that strengthens students’ connection with local cultural heritage.

The relevance of AI integration within SBT is further strengthened by the Indonesian Ministry of Primary and Secondary Education Regulation (Permendikdasmen No 13), which emphasizes *deep learning* approaches and the integration of coding and AI to improve literacy, numeracy, and critical thinking skills. The integration of AI into SBT aligns closely with the spirit of the impact-oriented curriculum, which prioritizes project-based learning and coding/AI integration as optional co-curricular subjects, particularly for upper elementary school levels (Grades 4, 5, and 6 onward). The implementation of AI-based interactive chatbots allows students to engage in two-way dialogue regarding the ecological wisdom embedded within *Bosi Timurung*. Rahmawati, D., (2024) argue that AI-powered intelligent assistants can create independent learning environments that support digital cultural literacy. Furthermore, within the context of sustainable education, AI enables connections between oral literature and environmental science issues. Students are able to analyze climate change data through cultural perspectives processed by AI systems, thereby creating a holistic interdisciplinary learning model.

Synergistic Integration of AI in Cultural Heritage to Support Sustainable Education

The integration of Artificial Intelligence (AI) into intangible cultural heritage, such as *Bosi Timurung* oral literature, constitutes a crucial strategy for achieving the goals of Education for Sustainable Development (ESD). AI is no longer perceived as an entity separate from tradition; rather, it functions as an instrument that strengthens cultural resilience and environmental literacy. This discussion highlights three major contributions of AI integration to the global Sustainable Development Goals (SDGs).

SBT oral literature contains local wisdom associated with noble values that can be integrated into educational processes, including historical values, honesty, morality, and mutual cooperation. Within the context of sustainable education, SBT functions as a medium for transferring local knowledge that supports Education for Sustainable Development (ESD). The implementation of generative AI enables the reconstruction of previously abstract cultural values into concrete visual learning materials. According to (Muna, H., 2023), local wisdom-based learning supported by digital technologies significantly enhances students’ environmental awareness. Through AI assistance, the values embedded in SBT are no longer studied merely as ancient texts, but are analyzed as traditional solutions to modern environmental crises. This result supports the argument of (Tamphu et al., 2024) regarding the effectiveness of local wisdom-based learning; however, it also demonstrates a significant advancement. Previous studies generally discussed local wisdom within conventional educational settings, whereas the current findings indicate that AI can transform traditional knowledge into interactive learning resources that are more relevant to contemporary sustainability challenges. Therefore, AI integration expands the educational scope of local wisdom beyond cultural preservation toward sustainability-oriented problem solving.

The sustainability of a nation is highly dependent upon its ability to preserve cultural identity. In line with SDG 11.4 concerning the protection of world cultural heritage, the use of Natural Language Processing (NLP) for the digitalization of SBT ensures the long-term preservation of this intellectual asset. Rohayati & Abdillah, (2024) and (Pradana, 2021) argue that the digitalization of cultural heritage represents a form of “digital sustainability” that prevents the extinction of traditional knowledge resulting from the disappearance of native storytellers.

AI enables cultural data to be stored, processed, and reaccessed by future generations through inclusive digital formats (Pozzi, F., Persico, D., Sancassani, S., Akçapınar, G., & Muñoz-Cristóbal, n.d.). Consequently, AI technology contributes to maintaining social stability and preserving collective memory, both of which constitute the foundation of sustainable societies.

The integration of AI into cultural heritage also promotes the development of quality education (SDG 4) based on twenty-first-century competencies. Students are encouraged not only to understand cultural content, but also to interact with advanced technologies. Sari & Santoso (2024) emphasize that the integration of AI within humanities curricula can significantly improve students’ critical thinking and creativity. In the case of SBT, students are able to analyze literary structures using AI analytical tools while simultaneously learning programming or multimedia design. This interdisciplinary approach is essential in sustainable education because it equips students with the ability to integrate cultural values, technological innovation, and environmental awareness into problem-solving processes.

Furthermore, the use of AI creates adaptive interdisciplinary learning models. In modern educational contexts, sustainability requires integration among science, technology, and the humanities. According to (Fu et al., 2024), cultural heritage is not limited to physical artifacts; it also encompasses intangible elements such as personal memories, community bonds, and visions for the future.

The implementation of generative media and interactive chatbots in learning SBT enables students to develop both digital literacy and cultural literacy simultaneously. Students are not only introduced to literary texts, but are also encouraged to explore how technology can be utilized to address humanitarian challenges, particularly cultural extinction. This process fosters a stronger *sense of belonging* and social responsibility among students in preserving the religious and cultural values embedded within this heritage as part of sustainable development initiatives.

AI-Based Curriculum Implications in SBT Learning: Critical and Operational Findings

Based on the empirical findings of this study, the implementation of *Sinrilik Bosi Timurung* (SBT) in the learning process indicates that the main challenge lies not only in limited documentation, but also in the mismatch between the characteristics of traditional oral narratives and the learning preferences of digital-generation students. The interview results confirm that all informants perceive younger generations as more responsive to visual and digital media compared to long oral texts, indicating that SBT-based learning requires a transformation in its mode of presentation.

In response to this condition, the study formulates curriculum implications at three operational levels. At the classroom level, SBT can be integrated through an *AI-assisted learning module* that includes automatic transcription, generative visualization, and cultural chatbot interaction to enhance student engagement. At the school curriculum level, SBT can be developed within a *project-based learning* model through tasks such as digital storytelling, ecological value analysis, and AI-based multimedia content production. Meanwhile, at the policy level, this integration aligns with (Permendikdasmen No 13, 2025); however, this study critically emphasizes that its implementation requires cultural validation and school ecosystem readiness to prevent distortion of cultural meaning. Thus, the findings indicate that AI integration in SBT is not only technologically innovative but also requires a contextual, measurable, and empirically grounded curriculum design to bridge cultural preservation with the learning needs of the twenty-first century. This conclusion partially aligns with previous studies emphasizing technology-assisted cultural education (Peile, 2011) and (Maxey & Gillmore, 2013). However, unlike those studies, which mainly focused on technology adoption, the present research identifies the importance of cultural validation mechanisms and curriculum readiness. Without these elements, AI implementation may risk simplifying or distorting the original cultural meanings embedded in SBT oral literature. This critical finding represents an important contribution to the discourse on AI-supported cultural heritage education.

CONCLUSION

This study concludes that the integration of artificial intelligence (AI) provides a strategic pathway for transforming *Sinrilik Bosi Timurung* (SBT) from a static form of oral cultural heritage into an interactive and contextually relevant educational medium. Through the use of Natural Language Processing (NLP) and generative media, AI can support the transliteration, contextual translation, and visualisation of SBT narratives, thereby addressing two major challenges in oral literature preservation: the loss of contextual meaning and the declining interest of younger digital generations. The main finding of this study indicates that AI does not replace oral

tradition but strengthens its sustainability by enabling Makassarese local wisdom to be reintroduced through digital learning formats. In this sense, SBT can function not only as a cultural artefact but also as a pedagogical resource that supports cultural literacy, moral education, ecological awareness, and Education for Sustainable Development (ESD). This finding confirms that the preservation of intangible cultural heritage should move beyond passive documentation towards adaptive, participatory, and educationally meaningful digital transformation. The theoretical contribution of this study lies in the formulation of AI-assisted oral literature preservation as an intersection between intangible cultural heritage, digital transformation, and sustainable education. The concept of "smart oral literature" proposed in this study expands the understanding of oral literature preservation by positioning local narratives as dynamic learning resources rather than merely archival objects. Methodologically, this study contributes by combining a descriptive qualitative case study with elements of Design Science Research (DSR), supported by a human-in-the-loop validation process involving cultural experts to reduce the risk of cultural bias and misinterpretation in AI-generated outputs. Based on these findings, this study recommends that local governments, educational institutions, and cultural preservation agencies develop validated digital corpora of Makassarese oral literature, integrate SBT-based AI learning materials into local content curricula, and provide teacher training on culturally responsive AI-based learning media. Such policies should focus on technological adoption and ensure expert validation, ethical representation, and community participation in every stage of cultural digitalisation. Future studies may expand this research by testing the effectiveness of AI-based SBT learning media with students, developing measurable evaluation instruments, and comparing similar oral traditions from other regions. These further studies are necessary to strengthen the empirical basis of AI-assisted cultural preservation and its contribution to sustainable education.

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