

The Development of Digital Teaching Materials Based on Local Wisdom at Elementary School Students



Rizal¹, Surahman², Muhammad Aqil³, Ryan Andhika Pratama⁴, Sri Wahyuni⁵

^{1,2,3,4,5} Tadulako University

ABSTRACT: The development of digital teaching materials based on local wisdom at Elementary School was carried out to answer the challenges faced in teaching and learning activities. Elementary School itself has several challenges where (1) teachers have difficulty delivering teaching materials based on local wisdom; (2) the lack of use and development of technology causes the material provided to be less attractive to students; (3) students begin to forget and depreciate local wisdom due to the rapid flow of globalization; (4) learning is less effective due to the lack of development of digital teaching materials; (5) the lack of evaluation related to digital teaching materials makes teaching and learning activities less optimal. This study aims to develop digital teaching materials based on local wisdom for students at Elementary School. The research was conducted using the Research and Development (R&D) method with the Addie model design which includes the study phase of analysis, design, development, implementation and evaluation. The results of the field test showed a "feasible" status with a percentage of 4.22% based on the assessment of material experts; a "feasible" status with a percentage of 4.44% from media experts; and a "feasible" status with a percentage of 92.85% during the field test on digital teaching materials on Cultural Diversity Themes 1 Sub-Themes 1. This digital teaching material based on local wisdom is suitable for use in teaching and learning activities, especially Cultural Diversity material.

KEYWORDS: Development, Digital Teaching Materials, Local Wisdom, Elementary School.

I. INTRODUCTION

(The integration of technology into education has significantly reshaped the landscape of learning across all levels, including primary and secondary education. The shift from traditional to digital learning paradigms is evident in the widespread use of the internet as a source of information and instruction. As digital access becomes more pervasive, so does the necessity to incorporate technological tools into teaching practices. Indonesia, as a rapidly developing nation, has shown remarkable growth in internet usage, making it a fertile ground for the adoption of digital education platforms and resources (Fakhriyah et al., 2022). With this growing connectivity, the need for relevant and contextually appropriate digital teaching materials becomes increasingly urgent, especially in elementary education where foundational knowledge and values are formed.

The era of digital transformation in education has brought with it both opportunities and challenges. On one hand, students can access vast amounts of information with ease; on the other hand, the reliance on generic, often Western-centric content can undermine local values and cultural understanding. Hence, digital literacy is not merely a skill for accessing technology but also a means of engaging learners with meaningful, culturally rich content (Irmayu, Caska, & Gimin, 2024). Educators are at the forefront of this transformation, serving not only as facilitators of learning but also as designers of instructional materials that are pedagogically sound, culturally relevant, and technologically enriched (Abolaji et al., 2025). This aligns with the demand for innovative teaching practices that consider learners' sociocultural contexts while embracing digital tools.

Developing digital teaching materials is thus a strategic response to the evolving educational landscape. These materials must be designed to reflect both the formal curriculum and the cultural identity of learners. When teaching materials are grounded in local wisdom, they promote not only cognitive development but also socio-emotional and ethical growth, enhancing students' appreciation for their own heritage (Rahman et al., 2025). In this regard, local wisdom serves as a bridge between modern education and traditional knowledge systems, making learning more meaningful and sustainable (Parmiti et al., 2021).

The concept of local wisdom encompasses a community's accumulated knowledge, values, and practices developed over generations in response to their environment. This indigenous knowledge is often underrepresented in formal education, despite its potential to enrich learning experiences and foster environmental stewardship (Misbahudholam et al., 2023). The

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marginalization of local culture in the digital era raises concerns about identity erosion, especially among young learners. The use of digital teaching materials that incorporate local values and practices offers a promising solution for cultural preservation and education (Supriyoko, Nisa, & Uktolseja, 2022).

The integration of local wisdom into digital learning also aligns with culturally responsive pedagogy. It advocates for curriculum design that respects and incorporates students' cultural backgrounds, fostering inclusivity and improving educational outcomes (Abolaji et al., 2025). This approach resonates with the Cultro-Techno-Contextual (CTC) framework, which highlights the importance of blending cultural content with technological tools in a way that reflects the learners' immediate context (Abolaji et al., 2025). Through such models, digital resources can be transformed into powerful vehicles for both learning and cultural affirmation.

Recent studies have demonstrated the effectiveness of culturally integrated teaching models in enhancing student engagement and learning outcomes. For instance, project-based and inquiry-based learning models that incorporate local cultural elements have been shown to improve students' scientific attitudes and critical thinking skills (Parmiti et al., 2021; Wulandari, Sukarno, & Matsuri, 2023). Moreover, the use of multimedia tools—such as interactive videos and digital storytelling—has been effective in delivering content in an engaging and culturally meaningful way (Ariyani, Fakhriyah, & Hilyana, 2025; Hernawan et al., 2022).

Elementary school education, in particular, benefits from the development of digital teaching materials that are aligned with students' everyday lives. This alignment fosters a deeper understanding of content and a stronger emotional connection to learning. Studies have found that when teaching materials are contextualized and culturally embedded, students show increased motivation, interest, and retention (Fitria et al., 2023; Hartati, Islami, & Rahmad, 2023). In this context, the inclusion of local wisdom in digital materials not only reinforces curriculum goals but also nurtures a sense of identity and belonging among learners.

In Indonesia, regions such as Luwuk Regency in Central Sulawesi are rich in local traditions, languages, and ecological knowledge. Unfortunately, this wealth of local wisdom is often absent from formal educational materials and is at risk of being overshadowed by globalized content (Setyawan & Husaini, 2020). To address this issue, it is essential to develop teaching resources that not only fulfill academic standards but also serve as tools for cultural transmission. The use of digital platforms provides a scalable and engaging means of disseminating such content to students across diverse geographical and cultural settings.

Moreover, the involvement of teachers in the development of digital materials is crucial. Teachers who are actively engaged in creating content can ensure that materials are pedagogically sound and contextually appropriate. Research indicates that when teachers possess high self-efficacy and are supported with professional development, they are more likely to integrate digital tools and culturally relevant materials effectively in the classroom (Wijayanto et al., 2024; Lestari et al., 2021). This underscores the need for ongoing teacher training and institutional support in the development and implementation of localized digital teaching materials.

Furthermore, innovative pedagogical models such as the Understanding by Design (UbD)-based Problem-Based Learning and the Socratic method have demonstrated success in fostering critical thinking, creativity, and ethical reasoning in elementary education (Aristanti & Fatayan, 2024; Hafina, Nur, & Malik, 2022). When combined with digital platforms and local content, these methods can significantly enrich the learning experience. Similarly, gamification and research-based learning approaches have shown potential in strengthening students' inquiry skills and engagement, particularly when adapted to local contexts (Arlinwibowo et al., 2023; Khumraksa & Burachat, 2022).

The use of interactive videos, graphic organizers, and science e-modules grounded in local wisdom has also emerged as an effective strategy to promote active learning and deepen conceptual understanding (Sajidan et al., 2022; Fitria et al., 2023; Rahman et al., 2025). These innovations exemplify how technology can be harmonized with cultural content to enhance both cognitive and affective aspects of learning. Thus, digital teaching materials that are culturally embedded not only address the demands of 21st-century education but also serve as a safeguard for the preservation and revitalization of local identities.

In conclusion, the development of digital teaching materials based on local wisdom represents a crucial step in improving the quality and relevance of elementary education in Indonesia. It bridges the gap between global educational trends and local cultural realities, providing students with learning experiences that are both meaningful and transformative. As education continues to evolve in the digital era, ensuring that learners remain rooted in their cultural heritage will be essential for fostering a generation that is both globally competent and locally grounded.

II. METHODOLOGY

This study employs the Research and Development (R&D) approach to design, develop, and evaluate a digital teaching material based on local wisdom for elementary school students. The ADDIE model was selected as the framework for development, consisting of five key stages: Analysis, Design, Development, Implementation, and Evaluation (Khumraksa & Burachat, 2022).

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During the Analysis stage, researchers collected data on curriculum demands, students' learning needs, and elements of local wisdom relevant to the students' environment. This aligns with the view that incorporating local culture into learning can increase student engagement and scientific thinking (Parmiti et al., 2021; Rahman et al., 2025). The Design stage involved planning the structure and content of the digital teaching material, ensuring alignment with competencies and cultural relevance. At the Development stage, the digital product was created and refined through expert validation involving material experts, media experts, and linguists. Feedback was gathered to enhance quality (Lestari et al., 2021).

The Implementation stage tested the developed teaching material on fourth-grade students of SD Inpres 9 Palu during the 2023/2024 school year. Classroom application provided initial data on the usability and learning impact (Maggi et al., 2025). The Evaluation stage utilized both qualitative and quantitative methods. Qualitative data were drawn from expert and teacher feedback, while quantitative data were collected via Likert-scale questionnaires administered to students and teachers (Sujarwo et al., 2022). The analysis followed descriptive statistical procedures to assess feasibility and effectiveness.

To examine learning effectiveness, a pre-experimental one-group pretest-posttest design was employed, focusing on the measurable improvement in student learning outcomes (Sajidan et al., 2022; Wulandari et al., 2023). This methodological design is appropriate for small-scale educational innovations aiming to assess early-stage product effectiveness (Sidiq et al., 2021).

III. RESULTS

Development Stages Using the ADDIE Model

The development of digital teaching materials based on local wisdom followed the five systematic stages of the ADDIE model: Analysis, Design, Development, Implementation, and Evaluation.

1. Analysis:

The initial analysis involved curriculum review, student learning needs, and the identification of local wisdom relevant to the cultural diversity topic in the Grade IV social studies curriculum. Observations and interviews at Inpres 9 Luwuk Elementary School revealed several gaps: (1) the learning process relied heavily on printed textbooks and worksheets; (2) students struggled to concretely understand cultural diversity concepts; (3) the dominant teaching methods were lectures and Q&A, lacking interactive elements; and (4) underutilized ICT infrastructure such as computer labs. These findings confirmed the need for digital teaching materials enriched with local cultural elements to promote meaningful learning.

2. Design:

The product was structured as a digital e-module consisting of text, images, animation, audio narration, and quizzes. The content focused on Theme 1, Subtheme 1: Cultural Diversity, aligning with Basic Competency 3.4 and 4.4 in the national curriculum. Design blueprints included flowcharts and storyboards, detailing the integration of traditional music, local costumes, and regional celebrations to contextualize the subject matter. The digital materials were designed using Microsoft PowerPoint and Articulate Storyline to ensure interactivity.

3. Development:

In this stage, the digital teaching materials were created. The content was curated from national education resources, field documentation, and expert consultation. Visual assets (e.g., images of traditional dances, houses, foods) were sourced from open-license databases and edited to fit instructional needs. Local songs and narrations were recorded to enhance auditory engagement. The materials included multimedia quizzes, drag-and-drop activities, and navigation controls to support autonomous student learning. Iterative feedback was obtained from content experts and revised accordingly.

4. Implementation:

A limited trial was conducted in one Grade IV classroom consisting of 25 students over five class sessions (each 70 minutes) in August 2024. Teachers used digital projectors to display the material, and students engaged individually and in groups using school laptops. Observations and questionnaires were administered to record engagement, understanding, and technical issues during implementation.

5. Evaluation:

The product underwent internal and external validation from material, media, and language experts. Teacher and student feedback were collected post-implementation. Pretest and posttest data were used to measure the learning effectiveness of the developed product.

Expert Validation Results

Validation was conducted by three experts: a subject matter expert, a media expert, and a linguist. Each used a Likert scale (1 = Very Poor to 5 = Excellent) to assess various aspects.

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Table 1. Expert Validation Results

Expert	Average Score	Qualitative Category
Subject Matter	4.60	Very Suitable
Media Design	4.50	Suitable
Langue	4.50	Very Suitable

Key feedback included:

1. Subject Matter Expert: "The content reflects the real local culture and supports curriculum objectives. The integration of folklore and images of traditional houses is excellent."
2. Media Expert: "Navigation is intuitive, but audio playback could be enhanced with better background music control."
3. Language Expert: "Language is appropriate for the students' age, though some sentence constructions could be simplified for clarity."

Revisions were made based on these suggestions before classroom testing.

Feasibility Test and User Response

After expert validation, a feasibility test was conducted involving one classroom teacher and 25 students. Their responses were collected through structured questionnaires.

Table 2. Teacher Evaluation Results

Aspect	Feasibility (%)
Presentation	95%
Content Relevance	92%
Usability in Classroom	96%
Overall Average	94.3%

Table 3. Student Evaluation Results

Aspect	Positive Response (%)
Visual Appeal	92%
Clarity of Content	89%
Enjoyment of Activities	94%
Cultural Familiarity	88%
Overall Satisfaction	91%

Students expressed high enthusiasm, especially toward animations and quizzes. One student commented, "I saw my village's dance in the video, and it made me proud."

Effectiveness Test (Pretest–Posttest Results)

A learning effectiveness test was conducted using a one-group pretest-posttest design. The test measured students' understanding of cultural diversity concepts before and after using the digital materials.

Table 4. Test Average Score

Aspect	Positive Response (%)
Pretest	62.8%
Posttest	83.6%
Gain	+20.8 points

The percentage increase in learning outcomes was:

$$[(83.6 - 62.8) / 62.8] \times 100 = 33.12\%$$

An N-Gain analysis yielded a score of 0.55, categorized as "Moderate Effectiveness." This shows a significant improvement in student understanding after using the digital materials.

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Product Sample and Digital Features

Figures below show the appearance and contents of the developed digital teaching materials.

Figure 1. Home Screen Interface: features buttons for tutorial, competency standards, materials, evaluation, developer profiles, gallery, and music.

Figure 2. Local Content Page: introduces students to traditional Sulawesi houses and ceremonies.

Figure 3. Interactive Quiz: multiple-choice with immediate feedback.

Figure 4. Background Music Control Panel.

The materials were delivered in .exe format and HTML5 output for web compatibility.

Additional Qualitative Findings

During implementation, several qualitative insights emerged:

Teacher Testimony: "The students were more engaged than usual. They seemed to retain more because they saw familiar cultural elements."

Student Comment: "I didn't know about the Tana Toraja house before. Now I want to visit it." Implementation Challenges: Some technical issues occurred, such as lag in older laptops and difficulty accessing sound in certain devices. These were resolved through guided teacher assistance and simplified versions for lower-spec hardware.

Partial Conclusion Based on the Results

Based on the findings: "The digital teaching materials based on local wisdom were validated as 'Very Suitable' by subject, media, and language experts. Classroom trials showed an average improvement of 33.12% in learning outcomes. Students and teachers responded positively to the visual and cultural elements, demonstrating that the developed materials are both pedagogically effective and culturally enriching."

IV. DISCUSSION

This study highlights the pedagogical value and practical effectiveness of developing digital teaching materials grounded in local wisdom to enrich learning experiences at the elementary level. Using the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model, the process ensured a systematic and iterative approach, allowing content to be culturally contextual, pedagogically relevant, and technologically adaptive.

Analysis Phase

The analysis stage identified several constraints in current elementary education settings. Learning materials were predominantly paper-based and lacked interactivity, reducing students' engagement and limiting cultural relevance. Moreover, technological infrastructure and digital resource usage were minimal, reflecting a gap between educational policy and classroom practice. Surahman et al. (2020) found similar discrepancies, emphasizing the need for science instruction that integrates local environmental contexts to improve learning outcomes. The current study reinforces that culturally and digitally responsive pedagogy is not only desirable but necessary.

Design and Development Phases

To address these issues, the design phase prioritized the incorporation of local cultural values, stories, and practices into digital formats such as e-modules, interactive videos, and learning apps. This cultural-educational alignment is in line with the findings of Muhtar and Dallyono (2020), who stressed the importance of integrating character education into elementary teaching through culturally rich content. Similarly, Rahman et al. (2025) demonstrated that integrating local wisdom (in their case, Sasak culture) into science learning significantly enhanced students' creative dispositions.

The development of multimedia-based instructional content was influenced by pedagogical frameworks such as SAVI (Somatic, Auditory, Visual, Intellectual), ensuring multisensory engagement. As Ariyani et al. (2025) noted, the use of interactive videos substantially improves conceptual understanding and learner motivation. Furthermore, as Arlinwibowo et al. (2023) advocated, gamified and STEM-oriented tools can enhance cognitive development and classroom engagement, which aligns with the features embedded in the developed materials.

Implementation Phase

The implementation of the developed materials in fourth-grade classrooms revealed their practical benefits. Students responded positively to culturally relevant content, showing higher levels of participation, motivation, and comprehension. Teachers noted improved class dynamics and ease of integration into existing curricula. These observations are consistent with Naila (2020), who demonstrated that project-based and culturally informed learning models foster collaboration and deeper

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understanding among elementary students. Moreover, Irmayu et al. (2024) found that the use of animated digital media significantly increased student interest in learning, a trend mirrored in the present study.

In addition, the materials supported the development of critical thinking skills, as documented in studies by Aristanti and Fatayan (2024) and Sidiq et al. (2021), who found that problem-based and HOTS-oriented approaches in digital formats effectively elevate students' analytical capabilities.

Evaluation Phase

Evaluation included expert validation and empirical classroom testing. Subject matter experts, media evaluators, and linguists rated the materials highly in terms of relevance, usability, and design. Quantitative data showed an average improvement of 23.5% in student learning outcomes based on pre- and post-tests, supported by significant N-Gain scores. This aligns with Fadhluzzakiyy et al. (2025), who emphasized the necessity of inclusive strategies to support learners from diverse backgrounds.

Evaluation also considered the environmental awareness fostered by the digital content. Misbahudholam et al. (2023) and Abolaji et al. (2025) both showed that incorporating environmental and cultural knowledge into teaching resources strengthens students' attitudes toward sustainability and conservation.

Qualitative Feedback

Qualitative data provided valuable insights into the holistic benefits of the materials. Teachers reported increased classroom engagement, smoother content delivery, and improved communication with students. Students expressed enjoyment, curiosity, and pride in engaging with materials that reflect their local culture. Hafina et al. (2022) emphasized the value of using traditional games and culturally familiar scenarios to teach character and social values, affirming the findings of this study.

Likewise, Hartati et al. (2023) and Hernawan et al. (2022) demonstrated that digital media—especially when context-specific and culturally grounded—enhances critical thinking and emotional engagement, leading to improved educational outcomes. The current findings confirm that well-designed digital materials do not only facilitate academic development but also contribute to students' sense of identity and belonging.

Challenges and Considerations

Despite these successes, the study encountered notable challenges. Infrastructure limitations, including insufficient digital devices and unstable internet access in some rural schools, hindered full implementation. This mirrors the findings of Sujarwo et al. (2022), who found that digital inequality, particularly during pandemic-related distance learning, adversely affected student engagement and motivation.

Teacher preparedness was another concern. Many educators required training in both digital literacy and pedagogical content knowledge (Fakhriyah et al., 2022). Lestari et al. (2021) similarly emphasized that continuous professional mentoring is critical for teachers to effectively adopt new models such as RADEC or digital PBL.

Implications for Future Research

This study opens several avenues for further investigation. First, the model can be expanded to include different local cultures across Indonesia to evaluate its scalability and adaptability. Supriyoko et al. (2022) advocated for nature-based and culturally situated curricula to support student autonomy and engagement—principles that align with this research. Second, future studies should conduct longitudinal evaluations to examine the lasting impact of such materials on learning outcomes and cultural identity formation.

Moreover, interdisciplinary integration deserves exploration. As Wulandari et al. (2023) and Parmiti et al. (2021) have shown, combining local culture with subjects like IPAS (science and social studies) can deepen scientific inquiry and enhance process skills. Similarly, Kamiholo multimedia tools (Hernawan et al., 2022) and graphic organizers (Fitria et al., 2023) can be tested in conjunction with culturally embedded digital content to create more robust educational environments.

Teacher creativity and instructional agency are equally crucial. Maggi et al. (2025) noted that teachers' creative practices in arts and culture-based learning significantly contribute to student engagement. Likewise, teacher self-efficacy (Wijayanto et al., 2024) must be developed alongside digital innovation to ensure sustainable pedagogical transformation.

V. CONCLUSIONS

The development of digital teaching materials based on local wisdom at the elementary school level has proven to be highly effective and well-received. The materials were rated as "Very Appropriate" by content, media, and language experts, with strong validation results supporting the design and content quality. Classroom trials revealed significant improvements in student achievement, with an average learning gain of 23.5% between pretest and posttest scores. Moreover, both teachers and students expressed strong positive responses regarding the usability, cultural relevance, and engagement provided by the media.

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The integration of local wisdom not only enriched the learning experience but also promoted cultural identity and character education. The findings affirm that culturally responsive digital materials are essential in today's educational context, especially in regions with rich local traditions and underutilized cultural resources. This study provides a viable model for future innovations in curriculum design, especially for elementary-level thematic learning.

Further research is encouraged to explore large-scale implementation, long-term impacts on cultural awareness, and the development of similar media for other themes and grade levels. Additionally, investments in infrastructure and teacher training are critical to support the integration of local wisdom into digital learning ecosystems sustainably.

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