



Development of a contextualized teaching module integrating local wisdom and digital technology for enhancing literacy learning in lower-grade elementary education

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Abstract

Background: Low early reading proficiency among elementary students remains a major challenge in implementing the Merdeka Curriculum, often due to limited contextual teaching materials, insufficient integration of local cultural values, and suboptimal use of digital literacy in Indonesian language instruction.

Aims: This study aimed to develop a contextual teaching module integrated with local wisdom and digital literacy to enhance early reading skills of lower-grade elementary students.

Method: A Research and Development approach using the ADDIE model analysis, design, development, implementation, and evaluation was applied. Data were collected through classroom observations, interviews, questionnaires, documentation, and early reading assessments.

Results: The developed module was categorized as highly valid and highly practical. Implementation demonstrated effectiveness in improving students' reading abilities, as reflected in high gain scores. The integration of local texts, audiovisual media, and interactive reading activities enhanced students' engagement, motivation, and comprehension.

Conclusion: Combining contextual learning, local wisdom, and digital literacy provides an effective strategy to strengthen foundational literacy skills. The module serves as an innovative approach to improving early reading outcomes in elementary education within the digital era.

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INTRODUCTION

The transformation of elementary education in the 21st century positions early reading as a cornerstone for intellectual, social, and emotional development among students. Early reading is understood not only as decoding words but also as the initial stage for developing critical thinking, communication, and lifelong literacy skills (Pergar & Hadela, 2021). Foundational reading abilities in the lower grades directly influence academic success in subsequent educational levels (Gersten et al., 2020; Lampi et al., 2025; P. Peng & Kievit, 2020; Porter et al., 2024). However, the rapid advancement of digital technology and changes in social interaction patterns present new challenges for reading instruction. Many students use digital devices primarily for entertainment, which reduces their engagement with reading activities. Traditional reading instruction often emphasizes memorization and repetitive exercises that are disconnected from students' real-life experiences. Language learning in lower grades faces additional challenges due to diverse regional languages and dialects, which can hinder vocabulary acquisition and phonological mastery (Haile & Mendisu, 2023). The integration of meaningful and adaptive teaching approaches is essential to address these multifaceted challenges. Teaching methods must engage students actively and connect learning

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content with their sociocultural environment. Developing instructional materials that combine technology, interactivity, and cultural relevance is therefore critical for early literacy development.

Integrating contextual teaching approaches enhances students' ability to construct knowledge based on their experiences. Contextualized learning promotes reflection, communication, and meaningful engagement with content (Gebre & Polman, 2020; Panday, 2025). Incorporating local culture and values can strengthen students' connection to the learning material, fostering both comprehension and motivation (Ratri et al., 2024). Digital technology can provide interactive media, audiovisual resources, and assessment tools to support these contextualized approaches (Alam & Mohanty, 2023; Al-Muttairi & Al-Alusi, 2025; Engerman & Otto, 2021). Combining technology with culturally relevant content allows students to interact with texts in a dynamic and engaging manner. Early literacy development benefits from activities that integrate storytelling, local narratives, and multimedia resources. Such integration can encourage students to develop meaning-making skills while enjoying the learning process. Effective instructional design considers both the developmental characteristics and the sociocultural context of lower-grade students. Moreover, integrating cultural content supports the development of character and social understanding. Consequently, instructional modules should not only deliver information but also promote active, reflective, and interactive learning experiences.

Despite these possibilities, existing teaching materials rarely combine contextual teaching, digital literacy, and local wisdom into a unified module. Most materials focus either on digital tools or cultural content without addressing early reading comprehensively. As a result, students may gain limited skills and motivation from fragmented instructional approaches. Current educational practices often fail to adapt to the technological and cultural realities of students' environments. There is also a lack of empirically validated modules that simultaneously address comprehension, engagement, and interactive learning. Instructional materials that integrate formative assessments, interactive exercises, and multimedia can enhance student learning outcomes. A holistic approach is necessary to bridge the gap between conventional reading instruction and innovative, technology-enhanced, culturally responsive learning (Cheng et al., 2021). Lower-grade students require scaffolding that combines technological engagement with culturally meaningful content. The development of integrated teaching modules can address diverse learning needs while fostering foundational literacy. Therefore, designing and evaluating a comprehensive module is both timely and necessary to improve early reading proficiency.

Despite numerous studies on digital literacy and its impact on students' learning competencies (D. Peng & Yu, 2022; Tinmaz et al., 2022), research rarely integrates digital skills with contextualized teaching approaches to enhance early reading in elementary education (Lestari et al., 2021; Rhodes et al., 2024). Similarly, investigations into early reading interventions have focused on mobile-assisted learning and skill acquisition (Hasanudin et al., 2022; Kuswandi & Fadhli, 2022; Kwok et al., 2021), yet few studies combine these approaches with local wisdom or culturally responsive pedagogy to create a meaningful and engaging learning experience (Harahap et al., 2025; Sakti et al., 2024). Furthermore, while research in elementary education contexts highlights inclusive and STEM innovations (Roberts-Tyler et al., 2023), there remains a lack of holistic teaching modules that simultaneously integrate cultural context, digital literacy, and early literacy pedagogy, leaving a gap in empirically validated instructional designs aimed at improving reading proficiency for lower-grade elementary students.

This study aims to develop a contextual teaching module that integrates local wisdom and digital literacy to enhance early reading skills in lower-grade elementary students. The study intends to produce a module that is practical, valid, and effective in fostering student engagement and comprehension. The module is designed to combine culturally relevant texts, interactive activities, and multimedia resources to create a meaningful learning environment. It seeks to improve reading

motivation by connecting literacy skills with students' everyday experiences and cultural context. The study also aims to provide a framework for teachers to implement digital and culturally responsive instruction effectively. Another objective is to evaluate the module's impact on students' reading proficiency using systematic assessments. The research further intends to demonstrate how integrated instructional materials can address challenges in early literacy education. Additionally, it aims to contribute to pedagogical practices by presenting an innovative model of culturally and technologically grounded learning. The module development process incorporates iterative design and assessment to ensure adaptability and relevance. Ultimately, the study strives to enhance foundational literacy while supporting holistic, interactive, and culturally meaningful learning experiences for elementary students.

LITERATURE REVIEW

Early reading skills are fundamental for the overall academic and cognitive development of elementary school students. Research indicates that literacy acquisition in the lower grades lays the foundation for critical thinking, problem-solving, and communication competencies. Various studies have explored methods to improve early reading, highlighting the importance of meaningful, engaging, and developmentally appropriate instructional materials (Kim et al., 2021; Norman, 2023; Teale et al., 2020). Traditional reading programs often emphasize rote memorization, repetitive exercises, and decoding skills, which can limit students' comprehension and motivation. Integrating technology into reading instruction has been shown to increase engagement through interactive media, audiovisual resources, and e-modules. Digital literacy skills support students' ability to navigate, analyze, and comprehend textual content effectively. However, the majority of digital reading interventions focus on upper elementary students or general reading skills without contextualization. This demonstrates the need for instructional approaches that simultaneously consider age-appropriate development and interactive engagement. Early reading interventions must address both cognitive and socio-emotional dimensions of learning. Therefore, combining digital tools with meaningful content is essential for improving literacy outcomes in lower-grade students.

Contextual teaching and learning (CTL) has emerged as an effective pedagogical approach to link students' experiences with academic content. CTL emphasizes active learning, problem-solving, and the integration of real-life experiences into instructional materials (Joshi, 2026). Studies show that contextualized modules improve student motivation, participation, and critical thinking skills in language learning contexts. Incorporating students' sociocultural environment into lessons supports the development of comprehension, meaning-making, and reflective learning practices. CTL-based reading interventions allow learners to connect text with their daily experiences, increasing relevance and engagement. Teachers who implement CTL strategies report higher student achievement and satisfaction. Despite these benefits, contextual approaches are not always combined with technological tools, limiting their potential in modern classrooms. Integration of CTL with digital media can enhance interactivity and provide immediate feedback for learners. Contextualized instructional materials can also support differentiated learning to accommodate diverse literacy levels. Consequently, developing reading modules that merge CTL with digital literacy is critical for effective early literacy instruction.

Local wisdom plays an essential role in contextualizing literacy learning and reinforcing cultural identity. Incorporating traditional stories, folklore, and cultural references into reading materials enhances comprehension and emotional connectedness. Cultural content supports character education, social awareness, and the ability to interpret language in meaningful contexts (Hossain, 2024; Sakti et al., 2024; Suri & Chandra, 2021). Studies have demonstrated that culturally

responsive teaching promotes engagement, motivation, and reflective learning among elementary students (Anyichie & Butler, 2023; Berlian & Huda, 2022). However, teaching materials based on local wisdom often target character development or secondary-level language learning rather than early reading skills. The lack of integration with technology further limits their appeal to digitally engaged students. Effective literacy modules should combine cultural content with interactive features to stimulate interest and comprehension. Local narratives can be augmented with multimedia, including audio, video, and interactive exercises. By leveraging cultural relevance alongside technology, instructional modules can provide richer and more meaningful reading experiences. Therefore, integrating local wisdom with digital literacy is necessary for holistic early reading development.

Digital literacy has increasingly become a critical component of effective literacy instruction in contemporary elementary education. Interactive e-modules, online reading platforms, and multimedia resources have demonstrated potential to enhance comprehension, motivation, and engagement. Students' ability to operate digital tools allows them to interact with texts dynamically and explore content independently. Research suggests that digital integration supports collaborative learning, problem-solving, and critical thinking in language instruction (Tang, 2024; Usfandi Haryaka, 2025). However, most digital reading interventions lack contextual relevance, making it difficult for students to relate content to their experiences (Coiro, 2021; Norman, 2023; Reiber-Kuijpers et al., 2021). Furthermore, digital modules are rarely combined with culturally relevant materials, limiting their effectiveness in developing meaning-making skills (Engerman & Otto, 2021; Handayani et al., 2026). Comprehensive literacy modules should merge technological interactivity with content grounded in local culture. This integration allows learners to develop both technical skills and literacy competencies simultaneously. Teachers play a critical role in facilitating digital and culturally responsive instruction. Consequently, developing modules that harmonize digital literacy with contextual and cultural elements is essential.

Despite the recognized benefits of contextualized, culturally grounded, and technology-enhanced instruction, research on integrated teaching modules remains limited. Existing studies often focus on isolated aspects, such as digital tools, cultural content, or general literacy skills, without combining all components. The gap indicates a need for holistic instructional designs that simultaneously address early reading, local wisdom, and digital literacy. Integrated modules can enhance engagement, comprehension, and motivation while fostering cultural identity and digital competence. Iterative development and evaluation of such modules ensure validity, practicality, and effectiveness for diverse learners. Lower-grade elementary students require developmentally appropriate scaffolding, interactive learning, and meaningful connections to content. By combining CTL principles, cultural narratives, and technology, modules can provide enriched literacy experiences. Such modules support differentiated instruction and active, reflective learning. Developing empirically validated instructional materials addresses both theoretical and practical gaps in literacy education. Therefore, a comprehensive, integrated reading module represents a strategic innovation for enhancing early literacy in contemporary elementary classrooms.

METHOD

Research Design

This study employed a Research and Development (R&D) approach using the ADDIE model, which consists of five stages: analysis, design, development, implementation, and evaluation. The ADDIE model was selected because it provides a systematic, flexible, and iterative framework for developing instructional materials tailored to digital literacy and contextual learning in elementary education. It supports the development of teaching modules aligned with the Merdeka Curriculum,

deep learning principles, and 21st-century literacy demands. This approach integrates formative assessment, expert validation, and iterative revisions to ensure pedagogical and technological effectiveness. The design aimed to produce a module that is valid, practical, and effective for lower-grade students. It allows continuous refinement through expert feedback and pilot testing to enhance usability and cultural relevance. The study combined quantitative and qualitative approaches to measure module effectiveness, engagement, and learning outcomes. Ethical considerations, including parental consent and student confidentiality, were maintained throughout the design and implementation process. Expert judgment and triangulation were incorporated to ensure scientific rigor. Overall, the design ensured that the module development process was systematic, evidence-based, and responsive to students' needs.

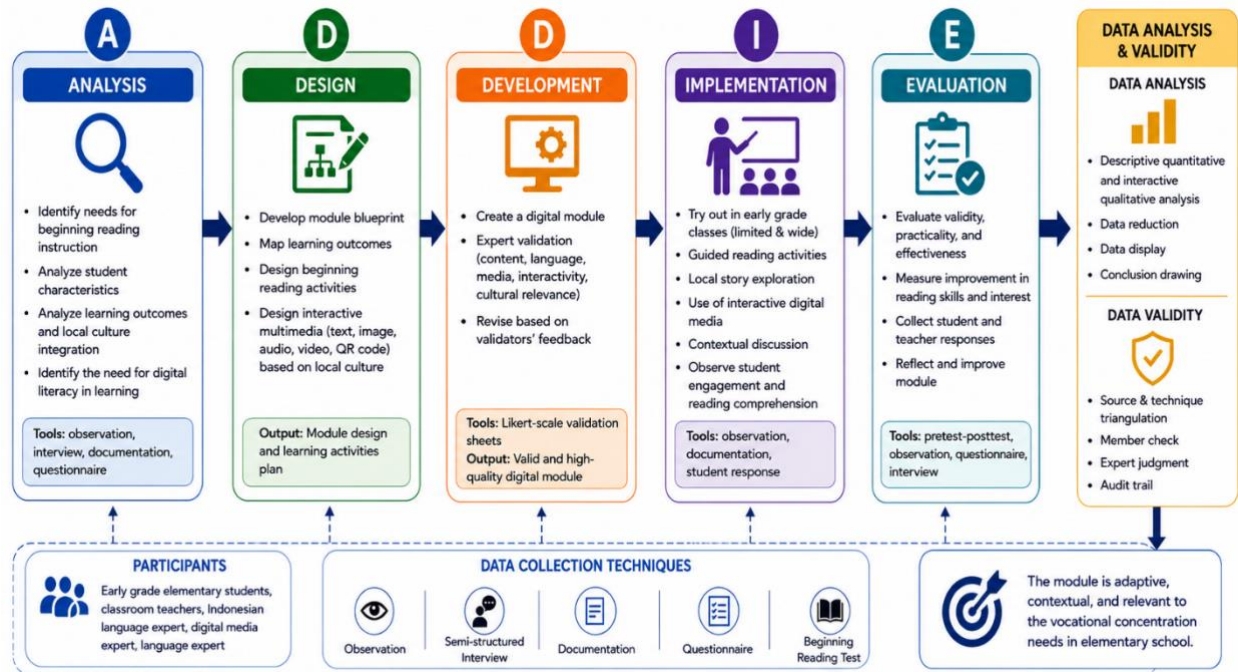


Figure 1. Research Implementation Procedure

Participants

The study involved lower-grade elementary school students from public schools, selected using purposive sampling based on literacy needs, cultural context, and readiness to use digital media. A total of 60 students participated, distributed across two classrooms for implementation trials. Classroom teachers, Indonesian language content experts, digital media specialists, and local culture experts were also involved in the module development and validation process. Students represented diverse linguistic backgrounds, including the use of regional languages in daily communication, which influenced module customization. Inclusion criteria required students to have foundational reading skills to engage with multimodal activities. Teachers participating in the study had a minimum of two years' experience in elementary literacy instruction. Expert participants provided feedback on content, pedagogy, media presentation, and integration of local cultural values. Parental consent and school approval were obtained prior to data collection. The heterogeneity of student reading abilities was considered in developing differentiated learning activities.

Instruments

Data were collected using multiple instruments, including observation protocols, semi-structured interviews, documentation, questionnaires, and early reading assessments. Expert validation sheets employed Likert-scale ratings to assess content feasibility,

readability, media quality, digital interactivity, and cultural relevance. Classroom observations captured student engagement, motivation, and interaction with digital materials. Questionnaires were used to gather perceptions of teachers and students regarding the practicality and effectiveness of the module. Pre-tests and post-tests measured early reading proficiency before and after module implementation. Documentation included lesson plans, screenshots of digital media, and samples of student work. Instruments were piloted to ensure clarity and reliability prior to formal data collection. Revisions were made based on pilot feedback to improve validity. Data collection procedures adhered to structured schedules aligned with the module's implementation phases. Triangulation of data sources strengthened credibility and accuracy of findings.

Data Analysis

Quantitative data, including validation scores and pretest-posttest results, were analyzed descriptively to determine module validity, practicality, and effectiveness. Gain scores were calculated to measure improvements in students' reading proficiency. Qualitative data from interviews, observations, and documentation were analyzed thematically to identify patterns in engagement, learning processes, and digital interaction. Interactive analysis methods included data reduction, data display, and conclusion drawing to integrate quantitative and qualitative insights. Triangulation ensured consistency across multiple data sources. Reliability measures were applied to observation and test scoring. Data interpretation focused on linking instructional design features with student outcomes. Results guided iterative revisions of the module. The analysis aimed to provide comprehensive evidence of the module's effectiveness in enhancing early literacy. Findings were used to inform recommendations for broader implementation and adaptation to different classroom contexts.

Procedure

The research procedure followed the five stages of the ADDIE model. The analysis stage involved identifying students' early reading needs through observations, interviews, documentation, and needs-assessment questionnaires. The design stage included mapping learning outcomes, developing the module blueprint, designing early reading activities, and creating interactive multimedia components. In the development stage, the digital module was created and validated by experts to ensure pedagogical and technological quality. Revisions were conducted iteratively based on expert feedback to enhance interactivity and cultural relevance. The implementation stage involved limited-scale and broader-scale trials using guided reading activities, exploration of local stories, and interactive digital media. Classroom implementation was observed to assess engagement, comprehension, and responses to multimedia. Finally, the evaluation stage assessed module validity, practicality, and effectiveness through pre- and post-tests, observation, questionnaires, and reflective interviews. Continuous feedback from teachers and experts was incorporated to refine the module. The procedure ensured the final product was both theoretically grounded and practically feasible for elementary classrooms.

RESULTS AND DISCUSSION

Results

The needs analysis stage was conducted to identify the conditions of early reading instruction among lower-grade elementary school students through observations, interviews, questionnaires, and documentation studies. The analysis focused on students' reading abilities, daily language use, teachers' readiness to utilize digital media, and the relevance of teaching materials to local culture.

Observation results indicated that reading instruction was still dominated by conventional methods centered on repetitive sound drills and simple texts, resulting in suboptimal student engagement in comprehending reading meanings. Interviews with teachers revealed that the limited availability of contextual teaching materials and digital media constituted major obstacles in creating engaging and meaningful learning experiences. Questionnaire results showed that students were more interested in visual media, audio materials, and interactive activities than in text-based learning alone. Documentation studies further demonstrated that the integration of local wisdom and digital literacy within teaching modules remained limited. These findings are consistent with studies by (Rahmatullah et al., 2025), (Desnika et al., 2025), and (Sari & Mahendra, 2025), which emphasize the importance of culturally and digitally oriented Indonesian language learning approaches in improving elementary students' engagement and literacy abilities.

Table 1. Findings of Learning Needs Identification

Data Collection	Analysis Focus	Main Findings	References
Classroom observation	Early reading instructional process	Learning remained teacher-centered and relied on simple texts	(Amijaya & Ristiani, 2023; Putri et al., 2025)
Teacher interviews	Instructional challenges and teaching material needs	Teachers required contextual digital-based modules	(Fithriyah et al., 2025)
Student questionnaires	Learning interest and media preferences	Students showed greater interest in visual, audio, and interactive media	(Yana & Sudarma, 2023; Zebua et al., 2024)
Documentation study	Analysis of modules and instructional devices	Integration of local culture and digital literacy remained minimal	(Ayuningrum et al., 2026; Hatima, 2025b)
Student language analysis	Use of local language in learning	Local dialects influenced Indonesian reading proficiency	(Desnika et al., 2025; Rahmatullah et al., 2025)
Digital needs analysis	Technology utilization in learning	Digital media had not been optimally utilized	(Sari & Mahendra, 2025; Wahyuni et al., 2024)

The needs analysis results indicated that early reading instruction for lower-grade students requires contextual, interactive, and local culture-based teaching materials. The limited integration of digital media, the minimal use of local wisdom texts, and the dominance of conventional teaching methods contributed to suboptimal student engagement. In contrast, students demonstrated stronger interest in visual media and interactive activities, indicating that the development of digital literacy-based teaching modules constitutes an essential educational need. The analysis of Indonesian language learning outcomes within the Merdeka Curriculum further emphasized the importance of contextual foundational literacy instruction aligned with the developmental characteristics of children aged 7–9 years, who remain at the concrete operational stage. The integration of folklore, traditional games, local vocabulary, and multimodal media such as audio, video, and digital books was considered capable of creating more meaningful, communicative, and relevant reading instruction connected to students' lived experiences (Ayuningrum et al., 2026; Hatima, 2025b; Sari & Mahendra, 2025; Yana & Sudarma, 2023).

Table 2. Analysis of Learning Outcomes, Student Characteristics, Local Wisdom, and Digital Literacy

Analysis Aspect	Main Findings	Implications for Module Development	References
Indonesian Language Learning Outcomes – Phase A	Focus on letter recognition, phonemic awareness, vocabulary acquisition, and simple reading skills	The module incorporates basic reading activities supported by visual and audio media	(Ihwan et al., 2025; Sya et al., 2021)
Indonesian Language Learning Outcomes – Phase B	Focus on reading fluency and text comprehension	The module includes exercises for identifying main ideas and understanding simple narrative texts	(Setiyadi et al., 2025)
Characteristics of students aged 7–9 years	Students require concrete, interactive, and enjoyable learning experiences	The module is designed using illustrations, language games, and multimodal activities	(N. D. Agustin & Yarmi, 2025)
Students' attention span	Students tend to have relatively short concentration spans	The module integrates brief activities, attractive visuals, and interactive tasks	(A. Agustin & Muthi, 2024; Ningsih et al., 2025)
Integration of local wisdom	Folklore, local culture, and surrounding environments strengthen meaningful learning connections	The module utilizes local texts and region-based cultural activities	(Hatima, 2025b; Saputra et al., 2025)
Digital literacy	Students show strong interest in audiovisual and interactive digital media	The module employs videos, QR codes, and simple digital learning media	(Sari & Mahendra, 2025; Wahyuni et al., 2024)
Contextual learning	Learning becomes more meaningful when connected to students' experiences	The module is developed using the Contextual Teaching and Learning (CTL) approach	(Amijaya & Ristiani, 2023; Putri et al., 2025)
Merdeka Curriculum and deep learning	Learning is directed toward meaningful learning and active exploration	The module supports deep learning through authentic experiential activities	(Fithriyah et al., 2025)

The development of the contextual teaching module blueprint based on local wisdom and digital literacy was carried out through the mapping of Indonesian language learning outcomes for Phase A and the early stage of Phase B, the identification of early reading indicators, and the analysis of students' needs for interactive learning media. The module was designed by integrating folklore, regional vocabulary, traditional games, and local cultural values into reading activities, while also utilizing multimodal media such as visual illustrations, audio materials, educational videos, QR codes, and simple interactive activities. The module design further adopted the principles of Contextual Teaching and Learning (CTL) to ensure that learning experiences become more meaningful, communicative, and closely connected to students' real-life experiences (Amijaya & Ristiani, 2023). The integration of local culture and digital literacy was considered capable of enhancing the quality of Indonesian language learning in elementary schools (Hatima, 2025b; Sari & Mahendra, 2025; Wahyuni et al., 2024).

Table 3. Description of Teaching Module Development

Blueprint Component	Development Description	Reference Integration
Learning Outcomes	Adapted to Indonesian Language Learning Outcomes for Phase A and Phase B	(Ihwan et al., 2025; Setiyadi et al., 2025)

Literacy Focus	Early reading, vocabulary acquisition, and simple text comprehension	
Learning Approach	Contextual learning based on students' real-life experiences	(Amijaya & Ristiani, 2023; Kaharu et al., 2023)
Integration of Local Wisdom	Folklore, local culture, traditional games, and regional vocabulary	(Hatima, 2025b; Saputra et al., 2025)
Digital Literacy	Audio, video, QR codes, visual illustrations, and interactive media	(Sari & Mahendra, 2025; Yana & Sudarma, 2023)
Learning Activities	Guided reading, language games, and simple discussions	(N. D. Agustin & Yarmi, 2025; Ningsih et al., 2025)
Formative Assessment	Reading exercises, simple reflections, and interactive evaluations	(Wahyuni et al., 2024; Zebua et al., 2024)
Module Visual Design	Simple, attractive, child-friendly, and multimodal interface	(Meiruly et al., 2024)

The blueprint development results indicated that the teaching module was designed as a multimodal learning medium integrating Indonesian language learning outcomes, contextual learning approaches, local wisdom, and digital literacy within a systematic and adaptive framework for lower-grade elementary school students. The module incorporated folklore, local vocabulary, visual illustrations, audio materials, educational videos, QR codes, and interactive reading activities to create more engaging, meaningful, and communicative learning experiences. Formative assessment components were developed through reading exercises, vocabulary identification, simple reflections, and text comprehension activities to monitor students' literacy development progressively. This design is consistent with the studies of (Sari & Mahendra, 2025; Wahyuni et al., 2024; Yana & Sudarma, 2023), which emphasize that the integration of interactive digital media and contextual learning effectively enhances elementary students' motivation and literacy skills.

Table 4. Module Content Design

Module Component	Design Description	Learning Objectives	Reference Integration
Local reading texts	Folklore, surrounding environments, and students' daily activities	To improve contextual reading comprehension	(Hatima, 2025b; Saputra et al., 2025)
Visual illustrations	Colored images and concrete visuals aligned with reading content	To support comprehension of textual meaning	(Meiruly et al., 2024)
Audio learning materials	Word pronunciation, reading aloud, and simple narration	To develop phonological awareness and reading fluency	(Sari & Mahendra, 2025)
Educational videos	Short videos based on local culture and reading activities	To enhance students' motivation and attention	(Yana & Sudarma, 2023; Zebua et al., 2024)
Interactive reading activities	Word games, guided reading, and simple discussions	To develop active reading skills	(N. D. Agustin & Yarmi, 2025; Ningsih et al., 2025)
Formative assessment	Reading exercises, vocabulary tasks, reflections, and text comprehension	To assess the development of early reading skills	(Wahyuni et al., 2024)
Integration of digital literacy	QR codes, audiovisual media, and simple digital activities	To develop foundational digital literacy skills	(Sari & Mahendra, 2025)

The design results demonstrated that the teaching module was developed as a multimodal learning medium integrating local texts, interactive visuals, audio, video, and reading activities grounded in students' real-life experiences. The module not only supported early reading instruction but also strengthened digital literacy and the introduction of local culture within Indonesian language learning. The product development adopted the principles of Contextual Teaching and Learning (CTL) through contextual texts, exploratory activities, and interactive digital media such as QR codes and audiovisual materials to create learning experiences that were more meaningful, communicative, and closely connected to students' daily lives. The integration of formative assessment enabled systematic monitoring of students' reading development. This module design aligns with the findings of (Amijaya & Ristiani, 2023; Sari & Mahendra, 2025; Yana & Sudarma, 2023) who confirmed that contextual learning supported by digital media effectively improves motivation, engagement, and literacy skills among elementary school students

Table 5. Development of the CTL-Based and Digital Literacy-Oriented Teaching Module

Development Component	Implementation in the Module	Development Objective	Reference Integration
CTL principles	Connecting texts with students' real-life experiences	To create meaningful learning experiences	(Amijaya & Ristiani, 2023; Putri et al., 2025)
Contextual texts	Local stories, daily activities, and cultural environments	To facilitate reading comprehension	(Hatima, 2025a)
Digital literacy	QR codes, audio, video, and interactive media	To develop foundational digital competencies	(Sari & Mahendra, 2025)
Visual media	Colored illustrations and concrete images	To enhance students' attention and comprehension	(Meiruly et al., 2024; Wahyuni et al., 2024)
Interactive activities	Word games, guided reading, and picture exploration	To increase learning participation	(N. D. Agustin & Yarmi, 2025; Ningsih et al., 2025)
Multimodal learning	Integration of text, audio, video, and visual activities	To accommodate diverse learning styles	(Yana & Sudarma, 2023; Zebua et al., 2024)
Formative assessment	Reading exercises and simple reflections	To monitor reading development	(Wahyuni et al., 2024)

The development results demonstrated that the digital teaching module was successfully designed as a multimodal learning medium integrating the principles of Contextual Teaching and Learning (CTL), digital literacy, and local wisdom within early reading instruction. The module combined local texts, visual illustrations, audio materials, videos, and contextual reading activities to create learning experiences that were more interactive, communicative, and relevant to the needs of elementary school students in the era of the Merdeka Curriculum. Product validation involved subject matter experts, digital media experts, and language experts using a Likert-scale instrument covering pedagogical aspects, visual design, linguistic appropriateness, media interactivity, and module usability. The validation process was conducted progressively and iteratively to ensure content validity, media design quality, and language readability aligned with the characteristics of lower-grade elementary students (Mangoki et al., n.d.; Setiawan et al., 2024).

Table 6. Summary of Digital Teaching Module Validation Results

Validator	Evaluated Aspects	Mean Score	Percentage	Category
Content Expert	Alignment with learning outcomes, material content, reading activities, and integration of local culture	4.62	92.4%	Highly Valid

Media Expert	Visual design, digital interactivity, audiovisual features, and ease of use	4.48	89.6%	Highly Valid
Language Expert	Language readability, sentence structure, and age appropriateness	4.55	91.0%	Highly Valid
Overall Average	Validity of the digital teaching module	4.55	91.0%	Highly Valid

The validation results indicated that the digital teaching module achieved a “highly valid” category with an overall feasibility score of 91.0%. Content experts assessed that the module content was aligned with the Indonesian language learning outcomes and contextually integrated local wisdom. Media experts stated that the visual design, audio, video, and interactive activities were appropriate for lower-grade elementary students and supported multimodal learning, while language experts evaluated the language use as communicative and suitable for students’ literacy development. Module revisions were conducted iteratively through the refinement of content materials, integration of local culture, language readability, visual appearance, digital media components, and formative assessment to ensure that the module became more systematic, engaging, and aligned with the principles of contextual learning and digital literacy within the Merdeka Curriculum framework (Mangoki et al., n.d.; Wahyuni et al., 2024).

Table 7. Summary of Module Revisions Based on Validator Feedback

Revision Aspect	Validator Feedback	Revision Actions	Revision Results
Learning materials	Texts needed to be more contextual and simplified	Adjusted vocabulary and reading content to students’ environments	Materials became more communicative and easier to understand
Integration of local culture	Local cultural elements needed strengthening	Added folklore and regional cultural activities	Local wisdom became more visible within the module
Visual design	Illustrations and colors needed to be more appealing	Improved visual design and color composition	The module became more attractive and child-friendly
Audio and video	Audio clarity and shorter video duration were needed	Enhanced audio quality and shortened video duration	Digital media became more effective for instructional use
Interactive activities	Reading activities required greater variety	Added word games and guided reading activities	Student engagement increased
Language	Sentences were too lengthy for lower-grade students	Simplified language structures and instructions	Language became simpler and more communicative
Formative assessment	Evaluation instructions needed clarification	Revised instructions and exercise formats	Assessments became easier for students to understand

The revision results demonstrated that the teaching module underwent substantial improvements in terms of content, language, visual design, and digital media, making it more communicative, contextual, and suitable for the characteristics of lower-grade students. The enhancement of local cultural integration, simplification of language, and refinement of illustrations, audio, video, interactive activities, and formative assessment improved the quality of multimodal learning and strengthened the module’s adaptability to the Merdeka Curriculum. A limited-scale trial involving third-grade elementary school students revealed that the use of the module through guided reading, exploration of local texts, audiovisual media, and language games successfully enhanced student engagement, positive responses toward digital media, and reading comprehension abilities. These findings reinforce the argument that contextual and multimodal learning approaches

effectively improve students' motivation and participation in Indonesian language learning (Kaharu et al., 2023; Yana & Sudarma, 2023).

Table 8. Results of the Limited Trial of the Digital Teaching Module for Grade III Elementary Students

Evaluation Aspect	Findings	Percentage	Category
Student engagement in learning	Students actively participated in reading activities and interactive media	90%	Excellent
Students' reading interest	Students showed enthusiasm toward local texts and visual media	88%	Excellent
Ease of module use	The module was easy for teachers and students to use	92%	Highly Practical
Reading comprehension	Students more easily understood contextual texts	85%	Good
Use of digital media	Audio, video, and QR codes attracted students' attention	89%	Excellent
Interactive reading activities	Word games and guided reading increased participation	91%	Excellent
Teacher responses toward the module	Teachers considered the module relevant to the Merdeka Curriculum	93%	Highly Practical
Overall average	Initial practicality and effectiveness of the module	89.7%	Excellent

The limited trial results demonstrated that the digital teaching module received positive responses from both teachers and third-grade elementary school students. The integration of local texts, visual illustrations, audio, video, and interactive reading activities effectively increased students' attention, engagement, and enthusiasm in early reading instruction. Teachers also considered the module easy to use and consistent with the contextual learning approach promoted in the Merdeka Curriculum. The implementation of the module through guided reading, text discussion, vocabulary identification, and exploration of local culture indicated that the digital media-based Contextual Teaching and Learning (CTL) approach effectively created Indonesian language learning experiences that were more meaningful, communicative, and participatory (Kaharu et al., 2023; Putri et al., 2025; Yana & Sudarma, 2023).

Table 9. Results of Teaching Module Implementation

Implementation Aspect	Findings	Percentage	Category
Student participation in guided reading	Students actively participated in reading and discussion activities	91%	Excellent
Reading fluency	Improvement in students' reading fluency was observed	87%	Good
Reading comprehension	Students demonstrated better understanding of contextual texts	88%	Excellent
Vocabulary mastery	Students' vocabulary improved through local texts	85%	Good
Interest in digital media	Audio, video, and illustrations enhanced students' attention	92%	Excellent
Contextual learning activities	Students more easily connected learning materials to daily experiences	90%	Excellent
Teacher responses to module implementation	Teachers considered the module practical and easy to implement	93%	Highly Practical
Overall average	Effectiveness of module implementation	89.4%	Excellent

The implementation results demonstrated that the Contextual Teaching and Learning (CTL)-based digital teaching module successfully created early reading instruction that was more active, engaging, and meaningful for third-grade elementary school students. The integration of local texts, visual illustrations, audio, and video contributed to improving reading comprehension, reading fluency, and student engagement by connecting learning materials with students' cultural experiences. Teachers also evaluated the module as practical, communicative, and aligned with the principles of the Merdeka Curriculum. Data collection was conducted through observations, interviews, response questionnaires, documentation, and early reading tests to obtain comprehensive data regarding the effectiveness, practicality, and improvement of students' reading abilities, while simultaneously strengthening the credibility of the study through data triangulation (Kaharu et al., 2023; Sari & Mahendra, 2025; Wahyuni et al., 2024).

Table 10. Results of Data Collection in Grade III Elementary School

Data Collection Technique	Focus of Data Collection	Main Findings	Percentage/Description
Observation	Student participation and engagement	Students actively participated in guided reading and interactive media activities	91% – Excellent
Teacher interviews	Practicality and module implementation	The module was considered easy to use and relevant	Highly Positive
Student interviews	Responses to media and local texts	Students were interested in audio, video, and local stories	Highly Positive
Student response questionnaires	Learning attractiveness and reading motivation	The module increased students' reading interest	89% – Excellent
Teacher response questionnaires	Effectiveness of contextual learning	The module supported active and communicative learning	92% – Highly Practical
Documentation	Evidence of implementation and learning outcomes	Learning activities were conducted interactively	Complete documentation
Early reading tests	Reading fluency and comprehension	Students' reading abilities improved	Moderate-to-high gain score category

The data collection results demonstrated that the digital teaching module based on Contextual Teaching and Learning (CTL) and digital literacy had a positive impact on early reading instruction for third-grade elementary school students. Observations, interviews, and response questionnaires indicated that the integration of local texts, visual media, audio, and video successfully enhanced students' engagement, enthusiasm, and ease in understanding reading materials. The early reading test results also revealed improvements in students' reading fluency and reading comprehension. The broader-scale trial, implemented through guided reading activities, exploration of local texts, contextual discussions, and interactive reading exercises, further confirmed that multimodal learning supported by digital media effectively improved elementary school students' motivation and literacy skills (Kaharu et al., 2023; Putri et al., 2025; Sari & Mahendra, 2025).

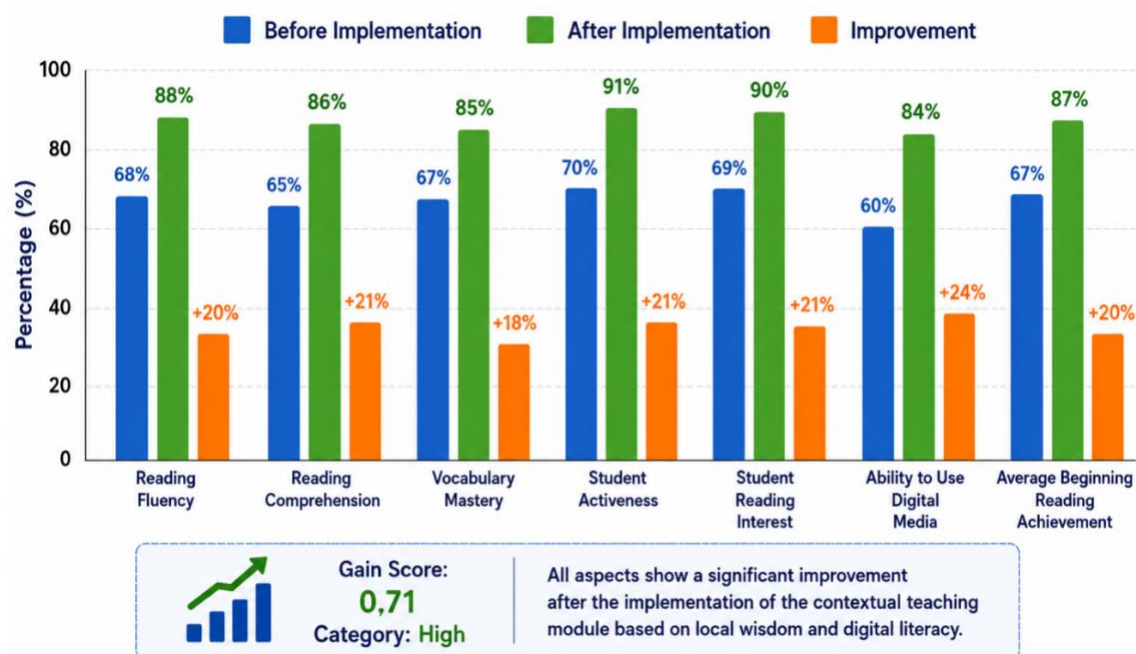


Figure 2. Results of the Broad-Scale Trial of the Digital Teaching Module for Grade III Elementary School

The results of the broader-scale trial indicated that the digital teaching module based on Contextual Teaching and Learning (CTL) and digital literacy effectively improved the early reading abilities of third-grade elementary school students. Improvements were observed in reading fluency (68%–88%), reading comprehension (65%–86%), vocabulary mastery (67%–85%), student participation (70%–91%), reading interest (69%–90%), and the ability to utilize digital media (60%–84%), with a gain score of 0.71 categorized as high. The integration of local texts, visual illustrations, audio, video, and interactive reading activities successfully enhanced students' motivation, attention, and engagement in Indonesian language learning. Data analysis was conducted quantitatively through percentages, mean scores, and gain scores, and qualitatively through observations, interviews, and documentation to comprehensively evaluate the validity, practicality, effectiveness, and learning experiences generated by the module (Kaharu et al., 2023; Sari & Mahendra, 2025; Wahyuni et al., 2024).

Table 11. Summary of Quantitative and Qualitative Data Analysis Results

Analysis Aspect	Evaluation Indicators	Analysis Results	Category
Product Validity	Content expert validation	92.4%	Highly Valid
	Media expert validation	89.6%	Highly Valid
	Language expert validation	91.0%	Highly Valid
Product Practicality	Teacher responses toward the module	93%	Highly Practical
	Student responses toward the module	89%	Highly Practical
Product Effectiveness	Improvement in reading ability	Gain score 0.71	High
	Student participation in learning	91%	Excellent
	Reading comprehension	86%	Excellent
Qualitative Analysis	Student engagement and learning motivation	Students became more active and enthusiastic	Positive

Implementation of contextual learning	Learning became more meaningful and communicative	Positive
Use of digital media	Audiovisual media increased students' attention	Positive

The analysis results demonstrated that the digital teaching module based on Contextual Teaching and Learning (CTL) and digital literacy possessed high levels of validity, practicality, and effectiveness in early reading instruction for elementary school students. Expert validation scores from content experts (92.4%), media experts (89.6%), and language experts (91.0%) all fell within the “highly valid” category, while teacher responses (93%) and student responses (89%) indicated that the module was highly practical for instructional use. The effectiveness of the module was reflected in the high-category gain score of 0.71, improvements in reading comprehension (86%), and increased student participation (91%). Qualitative findings further revealed that the integration of local texts, visual illustrations, audio, video, and interactive activities successfully enhanced students' motivation, engagement, and learning experiences. Final evaluation and refinement were conducted holistically through improvements in content, visual design, digital media, language, formative assessment, and the integration of local wisdom to ensure that the module became increasingly communicative, meaningful, and aligned with the implementation of the Merdeka Curriculum (Putri et al., 2025; Sari & Mahendra, 2025; Wahyuni et al., 2024).

Table 12. Final Evaluation and Refinement of the Teaching Module

Evaluation Aspect	Data Analysis Results	Follow-Up Improvements	Final Results
Content validity	Materials strongly aligned with Indonesian language learning outcomes	Improved local text examples and reading activities	Materials became more contextual
Practicality of use	Teachers and students could easily use the module	Simplified module usage instructions	The module became more practical
Learning effectiveness	Reading ability gain score categorized as high	Added gradual reading exercises	Learning became more effective
Visual design	Illustrations were attractive, but several pages were overcrowded	Adjusted layouts and color composition	Visuals became more child-friendly
Audio and video media	Digital media increased students' attention	Improved audio quality and shortened video duration	Media became more interactive
Interactive activities	Reading activities increased student participation	Added contextual language games	Activities became more varied
Module language	Language was sufficiently communicative	Simplified several lengthy sentences	Language became easier to understand
Formative assessment	Evaluation helped monitor student development	Improved instructions and assessment indicators	Assessment became more systematic

The final evaluation and refinement results indicated that the digital teaching module experienced substantial quality improvements in terms of content, visual design, digital media, language, and learning activities, making it more practical, communicative, and aligned with the characteristics of lower-grade elementary school students. The integration of local texts, visual illustrations, audio, video, and interactive reading activities was proven to enhance students' engagement and early reading abilities. The final product was developed as a digital teaching module based on Contextual Teaching and Learning (CTL), integrating local wisdom and digital literacy through local reading texts, multimodal media, QR codes, language games, and systematic child-friendly formative assessments. Overall, the module was considered feasible for use as an innovative

and adaptive medium for early reading instruction aligned with the implementation of the Merdeka Curriculum (Hatima, 2025a; Sari & Mahendra, 2025; Wahyuni et al., 2024).

Table 13. Contextual Teaching Module Integrated with Local Wisdom and Digital Literacy

Final Product Component	Product Description	Development Objective	Final Results
Local reading texts	Folklore, social environments, and regional culture	To establish contextual learning experiences	Texts became closer to students' lived experiences
Visual illustrations	Colored images and concrete visuals	To enhance students' comprehension and attention	Visuals became more attractive and child-friendly
Audio learning materials	Word pronunciation and reading aloud	To develop phonological skills and reading fluency	Audio became clearer and more communicative
Educational videos	Short videos based on local culture	To increase reading motivation	Videos became more interactive
QR codes and digital media	Access to additional learning resources	To develop students' digital literacy	The module became more modern and multimodal
Interactive reading activities	Word games, guided reading, and discussions	To increase student participation and engagement	Activities became more varied
Formative assessment	Reading exercises and simple evaluations	To monitor students' reading development	Evaluation became more systematic
Module design	Simple and communicative layout	To facilitate use by teachers and students	The module became more practical to use

The development of the final product demonstrated that the teaching module was successfully designed as a contextual, interactive, and adaptive medium for early reading instruction tailored to the needs of lower-grade elementary school students. The integration of local wisdom through folklore, regional culture, and students' social environments made learning experiences more meaningful and closely connected to students' daily lives. Meanwhile, the use of digital media such as audio, video, visual illustrations, and QR codes helped create more engaging, communicative, and multimodal learning experiences. The final module product also demonstrated high levels of validity, practicality, and effectiveness based on the implementation and evaluation results. Overall, this digital teaching module based on contextual learning and digital literacy is considered appropriate for use as an innovative Indonesian language learning resource to support the improvement of elementary school students' early reading skills within the era of the Merdeka Curriculum.

Discussion

The findings of this study indicate that the contextual teaching module integrated with local wisdom and digital literacy possesses strong validity, practicality, and effectiveness in improving the early reading skills of lower-grade elementary school students. Expert validation results categorized the module as "highly valid" in terms of content, media, and language aspects, as the module successfully integrated Indonesian language learning outcomes, developmental needs of lower-grade students, local texts, multimodal media, and guided reading activities. These findings reinforce the view that instructional material development based on the ADDIE model is capable of producing systematic, adaptive, and contextually relevant learning products (Cahyadi, 2019; Okpatrioka, 2023). The content validity of the module was further strengthened by the alignment between the instructional materials, Indonesian language learning objectives, language skill reinforcement, and

the foundational literacy needs of elementary school students (Ihwan et al., 2025; Setiyadi et al., 2025; Sya et al., 2021).

From the implementation perspective, the module proved practical for teachers and engaging for students because it presented reading instruction not only through text-based activities but also through experiential learning, visual media, audio, video, and interactive tasks. These findings are consistent with previous studies highlighting the effectiveness of Contextual Teaching and Learning (CTL) in improving participation, comprehension, and learning outcomes in Indonesian language education at the elementary level (Amijaya & Ristiani, 2023; Kaharu et al., 2023; Putri et al., 2025; Suanto et al., 2024). Early reading instruction became more meaningful because students were not merely recognizing letters and words, but also connecting reading content with their daily lives, social environments, and cultural experiences.

The integration of local wisdom emerged as a significant finding because it enhanced students' emotional connection to reading texts. Local stories, regional vocabulary, traditional games, and cultural values embedded within the module enabled students to comprehend texts more concretely and contextually. This finding strengthens previous studies asserting that Indonesian language learning based on local culture can foster character development, cultural identity, cultural literacy, and stronger relevance between learning experiences and students' lives (Ayuningrum et al., 2026; Hatima, 2025a; Ilawati & Nurlina, 2025; Nuramanah et al., 2025; Saputra et al., 2025; Setiawan et al., 2024). Thus, local wisdom functioned not merely as a decorative element within the module, but as a primary learning resource bridging students' home language, cultural background, and academic Indonesian language learning.

From the perspective of digital literacy, the findings demonstrated that the use of QR codes, pronunciation audio, educational videos, visual illustrations, and digital reading activities significantly increased students' attention, motivation, and engagement. These findings are consistent with studies on e-modules, digital books, instructional videos, audiovisual media, and digital teaching materials that contribute to improving reading skills, communication abilities, creativity, and literacy among elementary school students (Fimala et al., 2022; Wahyuni et al., 2024; Yana & Sudarma, 2023; Zebua et al., 2024). Nevertheless, the findings also emphasize that digital technology must be pedagogically directed so that it functions not merely as entertainment media, but as a structured, safe, and meaningful literacy tool for lower-grade students.

Pedagogically, the effectiveness of the module was reflected in improvements in reading fluency, reading comprehension, vocabulary mastery, student participation, and reading interest. These findings suggest that early reading skills develop more optimally when instruction is designed through a combination of contextual approaches, concrete visualization, interactive activities, and gradual formative assessment. The results are aligned with studies on project-based Indonesian language learning, deep learning, whole language approaches, ecological literacy, and differentiated instruction, all of which emphasize active, meaningful, and communicative learning experiences. Therefore, the developed module not only supported technical reading skills but also strengthened enjoyable, reflective, and child-centered learning experiences.

A critical discussion of these findings highlights the novelty contribution of the study, namely the simultaneous integration of contextual learning, local wisdom, and digital literacy into a single early reading module designed for lower-grade students. Previous studies have generally examined CTL, digital media, local culture, or reading skills separately, whereas this study integrated all four dimensions into a valid, practical, and effective instructional product design. Furthermore, the module responds to several challenges in Indonesian language learning at the elementary level, including low reading interest, limited contextual teaching materials, the influence of local dialects, the need for digital media integration, and variations in students' abilities (Kirana, 2022; Kurniawan, 2025; Sampe, 2025; Suci et al., 2025). Therefore, this study implies that innovation in early reading

instruction within the era of the Merdeka Curriculum should move beyond merely providing reading materials toward designing teaching modules that are contextual, multimodal, culturally inclusive, and relevant to children's digital ecosystems.

Implications

The findings of this study suggest significant implications for the development of elementary education, particularly in designing technology-enhanced and culturally responsive learning media. The integration of contextual learning with local wisdom and digital literacy demonstrates that teaching modules can be both interactive and meaningful, improving students' engagement and motivation. Incorporating local texts, traditional games, and cultural narratives strengthens students' connection to the learning materials and enhances comprehension. Digital tools such as audio, video, visual illustrations, and QR codes provide multimodal learning experiences that support active participation and exploratory learning. The module's design encourages student-centered instruction, allowing learners to explore content independently while fostering critical thinking and problem-solving skills. Pedagogically, the findings indicate that contextualized digital media can bridge abstract concepts with students' real-life experiences, making literacy learning more relevant. The results also imply that integrating formative assessment within multimodal modules facilitates continuous monitoring of students' reading proficiency and progress. Teachers can leverage these modules to implement differentiated instruction that accommodates diverse learning styles and literacy levels. Furthermore, the study underscores the importance of aligning educational technology with students' developmental characteristics, cultural backgrounds, and daily environments. From a practical standpoint, schools can adopt such modules to modernize literacy instruction while preserving cultural identity and values. The research also highlights the need for teacher training to enhance digital competence and effective utilization of culturally integrated instructional media. Overall, this study contributes to a framework for developing innovative, adaptive, and culturally meaningful literacy resources that can improve early reading outcomes and promote holistic learning experiences for elementary students.

Limitations and Suggestions for Future Research

This study is limited by its focus on lower-grade elementary school students within a specific geographic and cultural context, which may restrict the generalizability of the findings to other regions or educational settings. The sample size was relatively small, and participants were selected purposively, which may not fully represent the diversity of literacy levels and digital literacy readiness across broader populations. The module implementation was conducted over a limited period, which might not capture long-term effects on early reading proficiency or sustained engagement. Additionally, variations in teacher digital competence and familiarity with culturally responsive pedagogy may have influenced student outcomes. The study primarily focused on Indonesian language learning, and the applicability of the module to other subjects remains unexplored. While digital media and local wisdom were integrated, technological infrastructure and resource availability in different schools may affect module replication. Future research should consider longitudinal studies to evaluate the sustained impact of integrated modules on reading development. Expanding the sample to include multiple schools with diverse cultural and linguistic backgrounds could enhance external validity. Further studies could explore the integration of adaptive learning technologies to personalize literacy instruction. Investigating teacher training programs to support effective implementation of culturally and digitally integrated modules is also recommended. Cross-disciplinary applications, such as combining literacy with science or social studies, may provide insights into broader pedagogical benefits. Overall, continued research is necessary to refine module design, assess scalability, and explore innovative approaches to enhance early reading skills in diverse elementary education contexts.

CONCLUSION

The development of a contextual teaching module integrating local wisdom and digital literacy has been shown to be highly effective in enhancing early reading skills among lower-grade elementary students. The module demonstrated high validity, practicality, and effectiveness through iterative expert validation, classroom implementation, and student assessment. Integration of culturally relevant texts, audiovisual media, and interactive digital activities successfully increased students' engagement, motivation, and comprehension. The use of contextual teaching and learning approaches enabled students to relate literacy content to their daily experiences and cultural environment. Digital media provided multimodal learning experiences that supported active participation and independent exploration. Teachers reported that the module facilitated differentiated instruction and allowed for continuous monitoring of student progress. The module also contributed to the development of critical thinking, communication skills, and collaborative learning behaviors. Limitations related to sample size, contextual scope, and duration of implementation were identified, highlighting opportunities for future research. The findings suggest that culturally and technologically integrated instructional materials can serve as innovative solutions for early literacy challenges. This study provides a framework for incorporating local wisdom and digital literacy into language instruction. The research underscores the importance of teacher training in implementing integrated modules effectively. Overall, the developed module represents a strategic advancement in elementary literacy education, promoting meaningful, engaging, and culturally grounded learning experiences for young learners.

AUTHOR CONTRIBUTIONS STATEMENT

Nia Fitari conceptualized the research, designed the study framework, and supervised the development of the contextual teaching module integrating local wisdom and digital literacy. Touvan Juni Samodra was responsible for data collection, including classroom observations, interviews, documentation, and administering early reading assessments. Siti Halidjah contributed to module development by creating interactive multimedia content and integrating culturally relevant texts and activities. Nia Fitari performed data analysis, including descriptive quantitative analysis and thematic qualitative analysis, and interpreted the results. Nia Fitari and Touvan Juni Samodra jointly drafted the manuscript, ensuring alignment with academic writing standards and coherence across sections. Siti Halidjah reviewed the instructional design and provided expert input on cultural and technological integration. Nia Fitari critically revised the manuscript for methodological rigor, clarity, and adherence to research reporting guidelines. All authors participated in validation of the module, providing iterative feedback to refine its content, digital interactivity, and pedagogical effectiveness. All authors discussed and interpreted the findings collaboratively, ensuring the conclusions were evidence-based and consistent with the study objectives. All authors read and approved the final manuscript and agree to be accountable for all aspects of the research, including the accuracy and integrity of the work.

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