



Developing the MACA learning media through an evidence-based analysis of early reading skills and reading motivation among second-grade elementary students

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Abstract

Background: Early reading skills provide the foundation for children's academic success, yet many second-grade elementary students continue to demonstrate varied reading proficiency and insufficient motivation to participate in literacy activities. These challenges indicate the need for instructional media that is developed based on empirical evidence of students' reading performance and motivational characteristics.

Aims: This study aimed to establish an empirical foundation for developing the MACA (Media Anak Cinta Aksara) learning media by analyzing second-grade students' early reading skills, reading motivation, and instructional needs.

Method: This preliminary study employed a quantitative descriptive design involving 87 second-grade elementary students from four classes. Data were collected using the Words Correct Per Minute (WCPM) assessment, an adapted Reading Motivation Questionnaire (RMQ), and semi-structured teacher interviews, and were analyzed descriptively.

Results: The findings showed that 16 students were categorized as low readers, 51 as moderate readers, and 20 as high readers, with an average reading fluency of 61.18 correct words per minute. Reading motivation was assessed across seven dimensions, while teacher interviews revealed that limited reading practice, low self-confidence, inadequate family support, and the lack of engaging instructional materials were the primary factors hindering students' reading development.

Conclusion: The findings provide empirical evidence supporting the development of the MACA learning media as a structured and engaging instructional resource that addresses both cognitive and motivational aspects of early literacy, thereby contributing to the improvement of early reading skills and reading motivation among second-grade elementary students.

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INTRODUCTION

Early reading is one of the most fundamental literacy competencies that children are expected to develop during the first years of formal education. It provides the basis for acquiring knowledge, communicating ideas, and participating effectively in classroom learning activities. At the lower elementary level, students are expected to progress from recognizing letters to decoding words, reading simple sentences, and constructing meaning from written texts (Kim et al., 2021; Spaul et al., 2020; Wyse & Hacking, 2024). The successful acquisition of these foundational skills determines students' readiness to learn more complex concepts across different subject areas. Children who develop early reading proficiency are generally more confident in classroom participation and demonstrate greater independence in learning activities. Conversely, students with limited reading abilities often experience difficulties understanding instructions, completing

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academic tasks, and engaging in collaborative learning (Ahmed Abdel-Al Ibrahim et al., 2023; Segundo Marcos et al., 2020). These challenges may gradually reduce their confidence and limit their opportunities to achieve optimal academic performance. Differences in early reading competence among students also create varying learning needs that require appropriate instructional support. Therefore, strengthening early reading instruction has become an essential priority for ensuring that every child develops adequate literacy competencies during the early years of elementary education. Effective literacy instruction should not only improve technical reading skills but also create meaningful learning experiences that encourage continuous reading development.

The development of early reading competence is influenced by multiple factors that extend beyond students' cognitive abilities. Although some second-grade students are able to read fluently and confidently, others continue to struggle with recognizing letters, blending syllables, decoding unfamiliar words, and reading connected texts accurately. These students frequently hesitate while reading, require excessive time to pronounce words, and often display anxiety when asked to read aloud in front of their classmates. Such variations indicate that early reading instruction should accommodate diverse student characteristics rather than relying on uniform teaching approaches. Reading activities that emphasize repetitive drills without meaningful engagement may reduce students' interest in participating actively during literacy instruction (Kim et al., 2021; Robertson & Padesky, 2020; Shafiee Rad, 2025). Consequently, instructional practices should provide gradual learning experiences that enable students to develop reading skills according to their individual pace and level of readiness. Learning materials should also present familiar contexts, attractive visual elements, and structured reading activities that help children connect written language with meaningful experiences (Oakley et al., 2020; Yang et al., 2021). Instruction that is enjoyable and responsive to students' developmental needs is more likely to encourage active participation and sustained practice. These considerations demonstrate that improving early reading achievement requires instructional resources specifically designed to address students' actual learning characteristics. Therefore, identifying students' literacy needs represents an important initial step before developing instructional media intended to support early reading instruction.

In addition to technical reading competence, reading motivation plays a significant role in determining students' willingness to participate in literacy activities and sustain reading practice over time. Students with stronger reading motivation are generally more enthusiastic about exploring new reading materials, demonstrating persistence when encountering unfamiliar vocabulary, and viewing reading as an enjoyable learning experience (Nevo & Vaknin-Nusbaum, 2020; Sharma et al., 2024; Wei et al., 2021). In contrast, students with low reading motivation often avoid reading activities, become discouraged when facing difficulties, and participate passively during classroom instruction (Abdelrady et al., 2022; Calingasan & Plata, 2022; Sedova & Navratilova, 2020). These differences suggest that successful early literacy instruction should simultaneously develop cognitive skills and positive attitudes toward reading. Reading fluency provides an objective indicator of students' literacy development because it reflects both reading accuracy and reading speed during authentic reading activities. Measuring reading fluency enables teachers to identify students who require additional instructional support and monitor their progress systematically. At the same time, understanding students' reading motivation provides valuable information regarding the affective factors that influence literacy engagement. However, instructional practices in lower elementary classrooms frequently emphasize reading accuracy while paying less attention to students' motivational characteristics and learning experiences. As a result, learning activities may improve decoding skills without necessarily fostering sustained interest in reading. These conditions highlight the importance of developing instructional media that integrates reading fluency, reading motivation, and students' learning characteristics into a comprehensive literacy learning experience.

Recent studies have consistently established that early reading skills constitute a fundamental predictor of children's literacy development and subsequent academic achievement, with research focusing on reading interventions, foundational literacy instruction, and factors influencing early reading development (Clayton et al., 2020; Lane et al., 2025; Mascheretti et al., 2024; Porter et al., 2024). Concurrently, increasing attention has been devoted to reading motivation, demonstrating that students' intrinsic and extrinsic motivation substantially influence reading engagement, persistence, and literacy achievement, while instructional environments and motivational strategies contribute to improving reading outcomes (Barber & Klauda, 2020; McBreen & Savage, 2021; Syal & Nietfeld, 2024; Szenczi et al., 2024). Other researchers have emphasized the importance of objective reading fluency assessment through oral reading measures and automated assessment systems to accurately identify students' literacy performance (Ardington et al., 2021; Newell et al., 2020; Soto, 2026). Furthermore, previous studies have reported the effectiveness of various instructional media in supporting elementary students' learning outcomes, whereas needs analysis has primarily been employed to inform curriculum planning, instructional design, or educational program development across different educational contexts (Castulo et al., 2025; Park, 2021; Setyawan et al., 2026; Syawaluddin et al., 2020). However, existing research has generally investigated early reading skills, reading motivation, reading fluency assessment, instructional media development, and educational needs analysis as separate lines of inquiry, leaving limited empirical evidence on how these dimensions can be systematically integrated into a comprehensive needs assessment to guide the development of early literacy learning media for lower elementary students. Consequently, the development of instructional media has frequently relied on theoretical assumptions or single-dimensional analyses rather than comprehensive empirical evidence reflecting students' literacy performance, motivational characteristics, and teachers' instructional needs. To address this gap, the present study conducts an evidence-based needs analysis by integrating objective measures of early reading skills, multidimensional reading motivation, and teacher perspectives to provide a robust empirical foundation for developing the MACA (Media Anak Cinta Aksara) learning media for second-grade elementary students.

This study was conducted to establish an empirical foundation for developing the MACA (Media Anak Cinta Aksara) learning media through a comprehensive analysis of second-grade students' literacy characteristics and instructional needs. Specifically, the study sought to identify the current profile of students' early reading skills by examining their reading fluency during individual reading activities. The study also explored students' reading motivation to understand the affective factors influencing their participation in literacy learning. In addition, teachers' perspectives were examined to identify classroom challenges, students' learning characteristics, and existing instructional limitations in early reading instruction. Integrating these three sources of information was intended to generate a comprehensive picture of students' literacy needs before instructional media development. The findings were expected to provide objective evidence regarding the strengths and weaknesses of students' early reading performance. They were also expected to reveal motivational aspects that should be incorporated into the design of engaging literacy learning activities. Furthermore, the study aimed to ensure that the development of the MACA learning media would be grounded in actual classroom conditions rather than theoretical assumptions alone. An evidence-based understanding of students' literacy needs is expected to improve the relevance and practicality of the instructional media that will be developed. Ultimately, this study seeks to contribute to the development of effective literacy learning resources capable of improving both early reading skills and reading motivation among second-grade elementary school students.

LITERATURE REVIEW

Early reading skills represent the foundation of literacy development and constitute one of the most essential competencies acquired during the first years of elementary education. These skills encompass letter recognition, phonological awareness, decoding, word recognition, oral reading, and the ability to construct meaning from simple texts (Bruner et al., 2026; Ehri, 2022). The successful acquisition of these competencies enables children to access broader academic content because reading functions as the primary medium for learning across school subjects. Students who develop strong early reading skills generally demonstrate higher academic confidence, greater classroom participation, and improved learning independence (Pratiwi & Waluyo, 2023; Siegner & Stapert, 2020; Silinskas et al., 2020). Conversely, insufficient mastery of foundational reading skills may hinder children's ability to understand written instructions, solve academic tasks, and participate effectively in collaborative learning activities. Early reading development is influenced by various cognitive, linguistic, instructional, and environmental factors that interact throughout children's literacy experiences. Classroom instruction, family literacy practices, learning resources, and students' individual readiness all contribute to differences in early reading achievement. Because literacy development occurs progressively, instructional support should be aligned with students' developmental stages and learning characteristics. Effective early reading instruction therefore requires systematic learning experiences that combine explicit skill development with meaningful reading opportunities. Understanding students' initial reading characteristics is therefore essential for designing instructional interventions and learning media that effectively support literacy development.

Reading fluency is widely recognized as an important indicator of successful literacy development because it reflects students' ability to read accurately, efficiently, and with appropriate expression. Fluent readers are generally able to allocate greater cognitive resources to comprehension because word recognition has become increasingly automatic. In contrast, students with limited reading fluency often devote excessive cognitive effort to decoding individual words, thereby reducing their ability to understand the overall meaning of a text (Kieffer & Christodoulou, 2020; Rupley et al., 2020; Share, 2025). Consequently, reading fluency has become an important component of early literacy assessment and instructional decision-making. One of the most frequently employed measures of reading fluency is Words Correct Per Minute (WCPM), which objectively evaluates the number of words students read accurately within one minute. WCPM provides quantitative information regarding students' reading accuracy, speed, and overall fluency while allowing teachers to identify students who require additional instructional support (Baker et al., 2026; Dogar et al., n.d.; Martins & Capellini, 2021). Because the assessment procedure is efficient and standardized, WCPM has been widely adopted in elementary literacy assessment and educational research. The assessment also enables teachers to monitor students' reading progress over time and evaluate the effectiveness of instructional interventions. Beyond measuring performance, WCPM serves as an evidence-based tool for identifying learning needs and informing instructional planning according to students' literacy profiles. Therefore, integrating WCPM into the needs analysis process provides an objective empirical basis for developing learning media that responds to students' actual reading abilities.

Reading motivation refers to the internal and external factors that encourage students to participate willingly in reading activities and sustain their engagement with written texts. It influences not only students' willingness to read but also their persistence, reading frequency, and overall literacy achievement. Students with high reading motivation are generally more willing to explore new reading materials, overcome reading challenges, and develop positive attitudes toward

literacy learning (Kennedy & Chinokul, 2020; X. Li & Chu, 2021; Nevo & Vaknin-Nusbaum, 2020; Wang et al., 2020). Conversely, students with low reading motivation often avoid reading activities, demonstrate limited participation during literacy instruction, and experience slower reading development. Reading motivation is considered a multidimensional construct encompassing curiosity, involvement, academic value, competition, social recognition, emotional regulation, and freedom from boredom. These dimensions collectively influence how students perceive reading activities and determine the extent to which they actively engage with learning materials. Positive reading experiences, supportive classroom environments, and meaningful instructional activities contribute substantially to strengthening students' motivation to read. Learning media that incorporate attractive visual elements, interactive activities, contextual reading materials, and positive reinforcement are more likely to foster sustained reading engagement among young learners (Chen & Tsai, 2025; Chuang & Jamiat, 2023; Garcia, 2020). Consequently, reading motivation should be considered an integral component of instructional media development rather than merely an outcome of literacy instruction. Understanding students' motivational profiles therefore provides valuable evidence for designing learning media that simultaneously promotes reading competence and positive literacy experiences.

Instructional media play a critical role in facilitating meaningful learning experiences by transforming abstract concepts into concrete, engaging, and accessible learning activities. In literacy education, instructional media are expected not only to present reading materials but also to create interactive learning environments that encourage students to actively participate in reading activities. Well-designed learning media can accommodate diverse learning characteristics by integrating visual, textual, and interactive elements that support children's cognitive development and sustain their learning interest (Baikulova et al., 2026; Chuang & Jamiat, 2023; Iliska & Gudoniene, 2025). Recent advances in educational research emphasize that instructional media should be developed using an evidence-based approach rather than relying solely on teachers' intuition or theoretical assumptions. Evidence-based instructional media are designed based on empirical information regarding students' learning characteristics, academic performance, motivational profiles, and classroom instructional needs (Bonorden & Papenbrock, 2022; Liou et al., 2023; Val & Quintas, 2025). Such an approach enables developers to align instructional content, learning activities, and assessment strategies with students' actual learning conditions. Furthermore, evidence-based media development increases the likelihood that instructional resources will be practical, relevant, and capable of addressing authentic classroom challenges. For early literacy instruction, integrating objective reading assessments with students' motivational characteristics allows instructional media to support both cognitive and affective dimensions of learning simultaneously. This integration encourages students to develop reading competence while maintaining positive attitudes and sustained engagement in literacy activities. Therefore, developing evidence-based instructional media represents a systematic strategy for improving both the effectiveness and relevance of early reading instruction in elementary education.

Needs analysis constitutes a fundamental stage in instructional design because it provides comprehensive information regarding learners' characteristics, learning difficulties, instructional contexts, and educational priorities before educational products are developed. In educational research, needs analysis serves as a systematic process for identifying discrepancies between existing learning conditions and desired educational outcomes. The findings generated through needs analysis enable researchers and instructional designers to formulate development objectives that accurately reflect students' actual learning requirements. Conducting a comprehensive needs analysis also minimizes the risk of producing instructional media that fail to address classroom realities or students' developmental characteristics. Effective needs analysis integrates multiple

sources of evidence, including student performance data, motivational characteristics, classroom observations, and teachers' professional experiences (Aldrup et al., 2024; Bardach et al., 2022; Ekmekci & Serrano, 2022; L. Li & Liu, 2022). Such multidimensional information provides a stronger empirical foundation for determining instructional priorities and designing learning resources that are responsive to students' needs. Within the context of early literacy education, combining objective measures of reading fluency with assessments of reading motivation enables a more comprehensive understanding of students' literacy development. Teachers' perspectives further enrich this understanding by identifying instructional barriers, classroom practices, and contextual factors that may not be fully captured through quantitative assessments alone. Consequently, instructional media developed through comprehensive needs analysis are more likely to be relevant, practical, and effective in supporting literacy instruction. Therefore, integrating students' literacy performance, reading motivation, and teachers' instructional perspectives provides an evidence-based framework for developing the MACA (Media Anak Cinta Aksara) learning media that addresses the actual learning needs of second-grade elementary school students.

METHOD

Research Design

This study employed a quantitative descriptive design as the preliminary phase of a research and development (R&D) study aimed at establishing an empirical foundation for developing the MACA (Media Anak Cinta Aksara) learning media. Rather than evaluating the effectiveness of an instructional intervention, the study focused on identifying students' early reading skills, reading motivation, and classroom instructional needs prior to the media development process. A descriptive approach was selected because it enables researchers to obtain a comprehensive profile of learners' literacy characteristics without manipulating the learning environment. Furthermore, this approach provides objective evidence regarding students' reading performance and motivational characteristics, which are essential for designing instructional media that addresses actual classroom needs. The findings of this preliminary study were expected to provide an evidence-based reference for determining the instructional content, learning activities, and media features incorporated into the MACA learning media.

Participants

The study involved 87 second-grade elementary school students enrolled in four parallel classes, namely Class 2A, Class 2B, Class 2C, and Class 2D. The study population consisted of all second-grade students at the participating elementary school. A total sampling technique was employed to include all students who participated in the early reading assessment, ensuring that the collected data represented the literacy characteristics of the entire second-grade cohort. Students who were absent during the assessment period or had transferred to another school were documented; however, only students who completed the reading assessment were included in the WCPM analysis. In addition to student participants, the four classroom teachers participated as key informants to provide information regarding students' reading abilities, classroom literacy practices, family support, learning difficulties, and instructional strategies that had been implemented during reading instruction. Teachers' perspectives were considered important because they provided contextual information that could not be fully captured through quantitative assessments alone.

Instruments and Data Collection

Three complementary research instruments were employed to obtain comprehensive information regarding students' literacy characteristics and instructional needs. The first instrument

was the Words Correct Per Minute (WCPM) assessment, which measured students' early reading fluency by calculating the number of words read correctly within one minute. This assessment provided an objective indicator of students' reading accuracy and reading speed, enabling the identification of students with different levels of reading proficiency. The second instrument was a Reading Motivation Questionnaire (RMQ). The questionnaire consisted of 14 statements representing seven dimensions of reading motivation, namely curiosity, involvement, academic value, competition, social recognition, emotional regulation, and freedom from boredom. These dimensions were selected to capture both intrinsic and extrinsic aspects of students' reading motivation.

Table 1. Reading Motivation Questionnaire Indicators Based on the RMQ Adaptation

Indicator	Description	Item Number
Curiosity	The desire to read in order to learn new things that are personally interesting.	1, 8
Involvement	A sense of enjoyment or satisfaction when becoming immersed in a story or reading text.	2, 9
Academic Value	The view that reading is important for learning and gaining knowledge.	3, 10
Competition	The motivation to read in order to become better than peers.	4, 11
Social Recognition	The motivation to read in order to gain appreciation from teachers, parents, or friends.	5, 12
Emotional Regulation	The use of reading to calm oneself or regulate one's mood.	6, 13
Freedom from Boredom	Reading as an activity to avoid boredom.	7, 14

The questionnaire employed a four-point face-symbol Likert scale to accommodate the developmental characteristics of second-grade students. The response options consisted of Strongly Agree, Agree, Disagree, and Strongly Disagree. Positive statements were scored from 4 to 1, whereas negative statements were scored inversely. Consequently, the total questionnaire scores ranged from 14 to 56. Reading motivation levels were subsequently categorized into low, moderate, and high using the mean and standard deviation classification approach. The third instrument was a semi-structured teacher interview guide designed to obtain qualitative information regarding students who experienced reading difficulties, their academic and emotional behaviors during literacy instruction, family support, classroom instructional practices, and teachers' perceptions of the learning media required to improve students' early reading skills. The interview findings complemented the quantitative data by providing contextual explanations of students' literacy development and classroom learning conditions. Data collection was conducted sequentially. Initially, students individually completed the WCPM reading assessment under the supervision of the researchers and classroom teachers. Following the reading assessment, students completed the reading motivation questionnaire with assistance from the researcher when necessary to ensure that each statement was clearly understood. Finally, semi-structured interviews were conducted with classroom teachers to obtain comprehensive information regarding classroom literacy instruction and students' learning characteristics. All quantitative and qualitative data were subsequently reviewed to ensure data completeness before proceeding to analysis.

Data Analysis

The quantitative data obtained from the Words Correct Per Minute (WCPM) assessment were analyzed descriptively by calculating the frequency of students in the low, moderate, and high reading proficiency categories, together with the mean and standard deviation for each classroom. These descriptive statistics provided an overview of students' early reading performance and the variation in reading fluency across the participating classes. Reading motivation data were analyzed descriptively by calculating students' total questionnaire scores and categorizing them into low, moderate, and high motivation levels based on the predetermined classification criteria. In addition, descriptive summaries were generated for each motivation dimension to identify students' motivational characteristics across the seven constructs measured in the questionnaire. The qualitative data collected through teacher interviews were analyzed using qualitative descriptive analysis, which included data reduction, data organization, data presentation, and conclusion drawing. The qualitative findings were then integrated with the quantitative results to obtain a comprehensive understanding of students' literacy characteristics and instructional needs. This integration served as the empirical basis for designing the MACA learning media.

Research Procedure

The research procedure consisted of five sequential stages. The first stage involved developing the research instruments through the preparation of the WCPM assessment, adaptation of the Reading Motivation Questionnaire, and development of the teacher interview guide. The second stage consisted of administering the individual one-minute WCPM assessment to evaluate students' reading fluency, followed by the distribution of the reading motivation questionnaire to all participating students. The third stage involved conducting semi-structured interviews with classroom teachers to obtain additional information regarding students' literacy characteristics, classroom instructional practices, family support, and existing learning challenges. The fourth stage focused on verifying the completeness of the collected data and organizing both quantitative and qualitative information for analysis. During this stage, quantitative data were tabulated and categorized, whereas qualitative interview responses were coded and organized according to emerging themes. Finally, the fifth stage involved conducting descriptive data analysis and integrating the quantitative and qualitative findings to generate a comprehensive needs profile. The results of this preliminary needs analysis subsequently served as the empirical foundation for designing the MACA (Media Anak Cinta Aksara) learning media, ensuring that the proposed instructional media reflected students' actual literacy performance, motivational characteristics, and classroom instructional needs.



Figure 1. Research Method Flow

RESULTS AND DISCUSSION

Results

The WCPM test results indicate that the early reading skills of second-grade students have not developed uniformly. Of the 87 students analyzed, the majority fell into the moderate category, while the rest fell into the low and high categories. A summary of the WCPM results is presented in Table 2.

Table 2. Profile of Students' Early Reading Skills Based on WCPM

Grade	Low	Medium	High	Sum	Average WCPM	SD
2A	5	13	5	23	59,13	31,40
2B	4	13	4	21	63,19	30,39
2C	3	13	7	23	63,30	30,61
2D	4	12	4	20	59,10	32,18
Total	16	51	20	87	61,18	31,15

Based on Table 2, Class 2C had the highest average WCPM, at 63.30, while Class 2D had an average of 59.10. Overall, the students' average WCPM was 61.18 with a standard deviation of 31.15. This relatively large standard deviation indicates a wide variation in reading ability among students. A total of 16 students fell into the low category, 51 into the moderate category, and 20 into the high category. The results of teacher interviews revealed that students who were not yet fluent readers generally struggled to recognize letters and syllables, read haltingly, lacked confidence, were easily anxious, or received insufficient reading support at home. Teachers also noted that family support, a habit of reading at home, and engaging learning materials are essential to help students improve their reading skills.

The reading motivation instrument used in this study was developed based on the seven RMQ indicators. These indicators cover intrinsic aspects, such as curiosity, engagement, and emotional regulation, as well as extrinsic aspects, such as academic achievement, competition, and social recognition. Thus, reading motivation is understood not only as students' willingness to read but also encompasses their reasons, drives, and emotional experiences when interacting with reading material. The WCPM findings indicate that most second-grade students are in the transition phase toward reading fluency. Students in the intermediate category are generally able to read simple words and sentences but still need repeated practice to improve their speed, accuracy, and confidence. Meanwhile, students in the low category require more intensive support, particularly in letter recognition, syllable blending, and practicing reading simple words.

These conditions indicate that reading instruction in second grade needs to be designed in a differentiated manner. Students with low proficiency require more basic and gradual practice; students in the intermediate category need reinforcement of reading fluency; while students in the advanced category need to be provided with more varied reading challenges to ensure their literacy development remains optimal. The MACA learning media can be utilized to meet these needs through activities such as letter recognition, syllable reading, word reading, reading simple sentences, and strengthening reading motivation. Reading motivation is a key component in the development of MACA media. Lower-grade students tend to engage more easily when learning media features an attractive interface, playful activities, images that relate to children's experiences, and positive feedback. Therefore, the reading motivation indicators in the RMQ can serve as a basis for designing media features—such as engaging reading materials to foster curiosity, short stories to increase engagement, reading challenges to encourage healthy competition, and simple rewards for social recognition.

The implications of this study are the need to develop reading instructional materials that emphasize not only reading outcomes but also the process and students' experiences while reading. The MACA materials are expected to serve as an alternative learning tool that helps teachers provide reading guidance in a more structured and enjoyable manner. The limitations of this study lie in the nature of the data, which is still in the preliminary stage. The results presented here only describe the initial state of early reading skills and the design of the reading motivation assessment; therefore, they do not yet demonstrate the effectiveness of the MACA medium. Expert validation, practicality testing, and effectiveness testing of the medium need to be conducted in the next stage of development research. Further research is recommended to continue the development of the MACA media, conduct expert validation by media and content experts, carry out a pilot study, and assess improvements in early reading skills and reading motivation through a pretest-posttest design. Teachers are also advised to use the WCPM assessment results to determine reading support groups based on students' needs.

Discussion

The findings indicate that most second-grade elementary school students were classified in the moderate category of early reading skills, while a smaller proportion remained in the low and high proficiency categories. This distribution suggests that the majority of students have acquired basic decoding skills but have not yet achieved the level of automaticity required for fluent reading. The average WCPM score of 61.18 further demonstrates that students are in the transitional stage between initial decoding and fluent reading, where reading accuracy has begun to develop but reading speed and confidence still require continuous improvement. The relatively large standard deviation also reflects substantial heterogeneity in students' reading performance, indicating that literacy development progresses at different rates among learners. Such variation is expected because early reading acquisition is influenced by multiple cognitive, linguistic, instructional, and environmental factors rather than by age alone (Kidd & Donnelly, 2020; S.-Z. Zhang et al., 2020; X. Zhang et al., 2023). Students who remain in the low reading category may experience persistent decoding difficulties that interfere with comprehension and reduce their opportunities to participate actively in classroom learning. Conversely, students in the high category demonstrate that appropriate learning experiences and sufficient reading practice can accelerate literacy development even within the same classroom context. These findings reinforce the importance of conducting objective reading assessments before designing instructional interventions because learners at different proficiency levels require different forms of instructional support. The results also suggest that a uniform approach to reading instruction is unlikely to accommodate the diversity of students' literacy needs effectively. Therefore, the findings provide empirical justification for developing differentiated learning media capable of supporting students across varying levels of early reading proficiency.

The teacher interview findings complement the quantitative results by providing contextual explanations for the observed differences in students' reading performance. Teachers consistently reported that students experiencing reading difficulties struggled with letter recognition, syllable blending, hesitant oral reading, limited confidence, and insufficient reading practice outside school. These observations indicate that reading difficulties extend beyond decoding accuracy and are closely associated with students' emotional readiness, learning experiences, and home literacy environments. Family support emerged as another important factor influencing students' reading development because regular reading activities at home provide additional opportunities to reinforce classroom instruction. Students who receive limited literacy support outside school are more likely to experience slower progress despite participating in the same classroom instruction. Furthermore, teachers emphasized that conventional reading instruction often provides insufficient

opportunities for individualized practice and meaningful engagement with reading materials. This condition may explain why students with similar instructional experiences nevertheless demonstrate substantially different reading outcomes. The qualitative findings therefore strengthen the argument that improving early reading achievement requires interventions that address both instructional practices and students' learning environments. These findings also demonstrate the importance of incorporating teachers' professional perspectives into instructional media development because teachers possess practical knowledge regarding students' classroom learning characteristics (Lohvansuu et al., 2021; Wilde et al., 2021). Consequently, integrating quantitative literacy assessments with qualitative classroom evidence provides a more comprehensive foundation for designing instructional media that reflects authentic educational needs rather than theoretical expectations alone.

Another important finding of this study concerns the role of reading motivation as an essential consideration in developing the MACA learning media. Although this study did not examine the causal relationship between reading motivation and reading achievement, the multidimensional assessment illustrates that motivation represents a complex construct encompassing both intrinsic and extrinsic dimensions of students' literacy engagement. Students' willingness to read is influenced not only by their reading ability but also by their curiosity, enjoyment, confidence, emotional experiences, and perceptions of reading as a meaningful activity. Consequently, instructional media designed solely to improve decoding accuracy may produce limited learning outcomes if students remain reluctant to participate actively in reading activities. The integration of motivational dimensions into instructional media therefore becomes particularly important during the early stages of literacy development when students are still forming their attitudes toward reading (Barber & Klauda, 2020; Chu, 2021; Hava, 2021). Learning activities that incorporate attractive illustrations, meaningful stories, interactive exercises, and positive reinforcement are more likely to increase students' engagement and encourage sustained reading practice. These characteristics are particularly relevant for lower elementary students because young learners generally respond more positively to concrete, visually appealing, and play-oriented instructional experiences. Accordingly, the seven motivational dimensions measured through the adapted RMQ provide valuable guidance for determining the instructional features that should be incorporated into the MACA learning media. Rather than functioning solely as an assessment instrument, the motivational profile generated in this study serves as empirical evidence for designing learning activities that simultaneously strengthen reading competence and students' motivation to read. Therefore, integrating early reading skills and reading motivation within a single evidence-based instructional framework represents a promising strategy for developing literacy media that address both the cognitive and affective needs of second-grade elementary school students.

The findings of this study provide important implications for the development of the MACA (Media Anak Cinta Aksara) learning media because the needs analysis was conducted using multiple sources of empirical evidence rather than relying solely on theoretical assumptions. The integration of students' early reading fluency profiles, reading motivation characteristics, and teachers' instructional perspectives enables the development of learning media that more accurately reflects the actual learning conditions encountered in elementary classrooms. Unlike instructional resources designed from generalized curriculum expectations, evidence-based learning media have greater potential to address students' specific learning difficulties and developmental characteristics. The present findings indicate that students require learning activities that progress systematically from letter recognition to syllable blending, word decoding, sentence reading, and simple text comprehension while maintaining high levels of learning engagement. Furthermore, the interview results suggest that attractive visual elements, meaningful stories, interactive activities, and

immediate positive feedback should be incorporated into the instructional media to increase students' confidence and willingness to read (Kennedy & Chinokul, 2020). These characteristics demonstrate that effective literacy media should simultaneously accommodate the cognitive processes involved in reading acquisition and the affective experiences that influence students' persistence during learning. Consequently, the development of the MACA learning media should not be limited to presenting reading materials but should also create opportunities for students to experience reading as an enjoyable, meaningful, and rewarding activity. This evidence-based approach strengthens the alignment between instructional media, students' literacy needs, and classroom instructional practices, thereby increasing the practical relevance of the proposed learning resource. The integration of objective assessment data and qualitative classroom evidence also represents a systematic strategy for reducing the discrepancy between instructional design and authentic educational contexts. Therefore, the findings of this study establish a robust empirical foundation for developing literacy learning media that are pedagogically relevant, developmentally appropriate, and responsive to the diverse needs of second-grade elementary school students.

Beyond its practical contribution, this study also offers theoretical implications for research on early literacy instruction and educational media development. The findings support the view that students' early reading performance should not be interpreted solely through objective measures of reading fluency but should also be understood in relation to motivational and contextual factors that influence literacy development. This integrated perspective expands the conceptual understanding of needs analysis by demonstrating that comprehensive instructional planning requires the simultaneous consideration of cognitive achievement, motivational characteristics, and teachers' professional knowledge. Rather than treating reading fluency and reading motivation as independent constructs, this study illustrates that both dimensions should be considered complementary components in the design of instructional interventions for beginning readers. The proposed evidence-based framework also contributes to instructional design research by emphasizing that educational media should emerge from systematic analyses of learners' actual needs before product development begins. Such an approach may improve the validity, relevance, and instructional quality of educational products because development decisions are supported by empirical classroom evidence rather than assumptions alone. Moreover, this study provides a methodological contribution by demonstrating how quantitative literacy assessments and qualitative teacher perspectives can be integrated within a single needs analysis framework. The resulting framework may serve as a reference for future studies seeking to develop literacy learning media or other instructional resources for elementary education. Although the present study represents only the preliminary phase of media development, it establishes an evidence-based foundation that supports subsequent stages of product design, expert validation, practicality testing, and effectiveness evaluation. Therefore, the integration of early reading skills, reading motivation, and instructional needs analysis proposed in this study contributes both theoretically and practically to the advancement of evidence-based literacy instruction in elementary education.

Implications

The findings of this study provide important implications for literacy education by demonstrating that the development of instructional media should be grounded in comprehensive empirical evidence rather than relying solely on curriculum expectations or theoretical assumptions. The identification of students' early reading skills through the WCPM assessment enables teachers to recognize variations in reading proficiency and implement instructional strategies that are responsive to individual learning needs. Likewise, the assessment of reading motivation highlights the importance of incorporating both cognitive and affective dimensions into literacy instruction to encourage sustained student engagement. The integration of these two dimensions offers a more

holistic understanding of students' literacy development and supports the design of learning experiences that promote both reading competence and positive reading attitudes. The teacher interview findings further emphasize that effective literacy instruction requires learning resources capable of addressing classroom realities, including differences in students' reading readiness, confidence, and home literacy support. Consequently, the development of the MACA (Media Anak Cinta Aksara) learning media should incorporate structured reading progression, attractive visual elements, meaningful reading contexts, interactive activities, and motivational reinforcement that accommodate the developmental characteristics of second-grade learners. The study also demonstrates the practical value of conducting a systematic needs analysis before developing educational media, ensuring that instructional products reflect authentic classroom conditions and learners' actual requirements. From a pedagogical perspective, the findings encourage teachers to utilize objective literacy assessment data as the basis for planning differentiated reading instruction and providing targeted support for students with varying levels of reading proficiency. For instructional designers, the study offers an evidence-based framework that integrates reading fluency, reading motivation, and teachers' professional perspectives into a unified media development process. At the institutional level, the findings may support schools in strengthening early literacy programs through the adoption of assessment-informed instructional resources that address both academic and motivational aspects of reading development. Furthermore, the proposed approach contributes to the growing emphasis on evidence-based educational practices by demonstrating that systematic needs analysis can improve the relevance, practicality, and instructional quality of learning media. Ultimately, this study provides a comprehensive empirical foundation for developing literacy learning media that supports equitable, engaging, and developmentally appropriate early reading instruction while fostering students' long-term literacy growth and motivation to read.

Limitations and Suggestions for Future Research

This study has several limitations that should be considered when interpreting the findings and planning subsequent research. First, the study represents only the preliminary needs analysis stage of the research and development process; therefore, it does not evaluate the effectiveness of the proposed MACA (Media Anak Cinta Aksara) learning media in improving students' literacy outcomes. Second, the study was conducted in a single elementary school involving a relatively limited number of second-grade students, which may restrict the generalizability of the findings to broader educational contexts with different demographic and instructional characteristics. Third, students' early reading skills were assessed using the Words Correct Per Minute (WCPM) measure, which primarily reflects reading fluency and does not comprehensively assess other important components of literacy development, such as reading comprehension, vocabulary acquisition, and oral language proficiency. Fourth, although reading motivation was examined through a multidimensional questionnaire, the present study did not investigate the causal relationship between motivational factors and reading performance. In addition, the qualitative findings were derived solely from classroom teacher interviews and did not include perspectives from parents or students, which could have provided a more comprehensive understanding of the factors influencing early literacy development. Future research is therefore recommended to continue the subsequent stages of the research and development process by designing, validating, and refining the MACA learning media through expert review and iterative product revision. Further studies should also conduct pilot implementation and large-scale field trials involving schools from different geographical regions and socioeconomic backgrounds to enhance the external validity of the findings. Employing quasi-experimental or experimental research designs is recommended to evaluate the effectiveness of the MACA learning media in improving early reading skills, reading

motivation, reading comprehension, and other literacy-related outcomes. Future investigations may also integrate additional assessment methods, including digital literacy analytics, observational data, and longitudinal monitoring, to obtain a more comprehensive understanding of students' literacy development over time. Furthermore, incorporating parents' perspectives and home literacy practices into future needs analyses would provide richer evidence regarding the interaction between school-based instruction and family literacy support. Addressing these limitations will contribute to the development of more robust, evidence-based literacy learning media and strengthen the practical implementation of early reading instruction for diverse elementary school populations.

CONCLUSION

This study successfully established an empirical foundation for developing the MACA (Media Anak Cinta Aksara) learning media through a comprehensive needs analysis of second-grade elementary school students' early reading skills, reading motivation, and instructional needs. The findings revealed that students' early reading abilities varied considerably, with the majority demonstrating moderate reading proficiency while a substantial proportion remained in the low reading category, indicating that many learners are still progressing toward fluent reading. The results also demonstrated that reading motivation should be viewed as a multidimensional construct encompassing both intrinsic and extrinsic aspects that influence students' engagement in literacy activities. Furthermore, teacher interviews identified several challenges affecting early literacy development, including limited reading fluency, low reading confidence, insufficient literacy support at home, and the need for more engaging instructional resources. These findings indicate that improving early reading instruction requires educational approaches that address not only technical reading skills but also students' motivational characteristics and authentic classroom learning conditions. The integration of quantitative literacy assessment and qualitative teacher perspectives provided a comprehensive understanding of students' learning needs and strengthened the evidence base for instructional media development. Consequently, the proposed MACA learning media is expected to accommodate variations in students' reading abilities by providing structured literacy activities that progressively develop foundational reading competencies while fostering positive reading experiences. This study also demonstrates the importance of conducting systematic needs analysis before developing educational media to ensure that instructional products are relevant, practical, and responsive to learners' actual characteristics. The evidence-based approach adopted in this study contributes to instructional design by emphasizing that educational media should be informed by objective learner data rather than theoretical assumptions alone. From a practical perspective, the findings offer valuable guidance for teachers, instructional designers, and schools in planning differentiated literacy instruction supported by evidence-informed learning resources. From a theoretical perspective, the study contributes to the growing body of research advocating the integration of cognitive and affective dimensions within evidence-based literacy education. Overall, this study provides a robust empirical basis for the subsequent design, validation, implementation, and evaluation of the MACA learning media as an innovative instructional resource to improve early reading skills and strengthen reading motivation among second-grade elementary school students.

AUTHOR CONTRIBUTIONS STATEMENT

Elin Nuraida contributed to the conceptualization of the study, research design, methodology development, instrument adaptation and development, data collection, investigation, formal analysis, data curation, visualization, preparation of the original manuscript draft, project

administration, and correspondence with the journal. Mubiar Agustin contributed to the conceptualization of the study, methodological refinement, supervision, validation of the research design and instruments, interpretation of the findings, critical review of the manuscript, and substantive editing of the final version. Vismaia S. Damayanti contributed to the conceptualization, supervision, methodology, validation, interpretation of the results, critical revision of the manuscript for important intellectual content, language refinement, and final manuscript editing. All authors contributed to discussing the findings, reviewed and approved the final version of the manuscript, and agreed to be accountable for all aspects of the work, ensuring the accuracy, integrity, and scientific quality of the research.

REFERENCES

- Abdelrady, A. H., Jahara, S. F., Elmadani, A. E. A., & Kumar, T. (2022). *The attitude of Sudanese EFL students towards literature to enrich their vocabulary building*. *Education Research International*, 2022, Article 7569371. <https://doi.org/10.1155/2022/7569371>
- Ahmed Abdel-Al Ibrahim, K., Cuba Carbajal, N., Zuta, M. E. C., & Bayat, S. (2023). Collaborative learning, scaffolding-based instruction, and self-assessment: Impacts on intermediate EFL learners' reading comprehension, motivation, and anxiety. *Language Testing in Asia*, 13(1), 16. <https://doi.org/10.1186/s40468-023-00229-1>
- Aldrup, K., Carstensen, B., & Klusmann, U. (2024). The role of teachers' emotion regulation in teaching effectiveness: A systematic review integrating four lines of research. *Educational Psychologist*, 59(2), 89–110. <https://doi.org/10.1080/00461520.2023.2282446>
- Ardington, C., Wills, G., Pretorius, E., Mohohlwane, N., & Menendez, A. (2021). Benchmarking oral reading fluency in the early grades in Nguni languages. *International Journal of Educational Development*, 84, 102433. <https://doi.org/10.1016/j.ijedudev.2021.102433>
- Baikulova, A., Akimbekova, S., Kerimbayeva, R., Arzymbetova, S., & Moldagali, B. (2026). Leveraging digital interactive didactic games to enhance cognitive development in preschool education. *E-Learning and Digital Media*, 23(1), 1–18. <https://doi.org/10.1177/20427530241261294>
- Baker, D. L., Le, N., Basaraba, D. L., & Herrera, C. (2026). Dynamic interaction between text characteristics, order and time of assessment on bilingual student reading efficiency in Spanish and in English. *School Psychology Review*, 55(1), 32–45. <https://doi.org/10.1080/2372966X.2024.2398986>
- Barber, A. T., & Klauda, S. L. (2020). How reading motivation and engagement enable reading achievement: Policy implications. *Policy Insights from the Behavioral and Brain Sciences*, 7(1), 27–34. <https://doi.org/10.1177/2372732219893385>
- Bardach, L., Klassen, R. M., & Perry, N. E. (2022). Teachers' psychological characteristics: Do they matter for teacher effectiveness, teachers' well-being, retention, and interpersonal relations? An integrative review. *Educational Psychology Review*, 34(1), 259–300. <https://doi.org/10.1007/s10648-021-09614-9>
- Bonorden, M., & Papenbrock, J. (2022). Evidence-based optimization of classroom teaching units using 3D printers for designing models: From the 2D picture to the 3D flower model. *Education Sciences*, 12(11). <https://doi.org/10.3390/educsci12110831>
- Bruner, L., Hiebert, E. H., & Tortorelli, L. S. (2026). The role of text vocabulary in word recognition, reading rate, and comprehension of first-grade students. *Reading and Writing*. <https://doi.org/10.1007/s11145-026-10829-x>
- Calingasan, K. A. A., & Plata, S. M. (2022). Effects of effort praise on struggling Filipino ESL readers' motivation and mindset. *Indonesian Journal of Applied Linguistics*, 11(3), 601–611. <https://doi.org/10.17509/ijal.v11i3.32898>
- Castulo, N. J., Marasigan, A. C., Buenaventura, M. L. D., de Vera, J. L., Bagaporo, E. C., Juan, M. P. C. S., & Dalida, N. S. (2025). Contextualizing the challenges of education graduate students in the Philippines: Translating needs analysis into strategic solutions. *Discover Education*, 4(1), 27. <https://doi.org/10.1007/s44217-025-00416-7>

- Chen, C.-C., & Tsai, Y.-H. (2025). Effect of interactive e-book use on learning engagement, satisfaction and perceived learning. *Education and Information Technologies*, 30(11), 15757–15789. <https://doi.org/10.1007/s10639-025-13415-w>
- Chu, Z. (2021). Effects of digital media integrated reciprocal teaching on students' reading ability and motivation. *Revista de Cercetare și Intervenție Socială*, 73, 299–311. <https://doi.org/10.33788/rcis.73.19>
- Chuang, C., & Jamiat, N. (2023). A systematic review on the effectiveness of children's interactive reading applications for promoting their emergent literacy in the multimedia context. *Contemporary Educational Technology*, 15(2), ep412. <https://doi.org/10.30935/cedtech/12941>
- Clayton, F. J., West, G., Sears, C., Hulme, C., & Lervåg, A. (2020). A longitudinal study of early reading development: Letter-sound knowledge, phoneme awareness and RAN, but not letter-sound integration, predict variations in reading development. *Scientific Studies of Reading*, 24(2), 91–107. <https://doi.org/10.1080/10888438.2019.1622546>
- Dogar, M. F., Shah, S. K., Imran, M., & Almusharraf, N. (2025). Evaluating oral reading fluency in English as a second language: A quantitative analysis. *Reading & Writing*, 16(1), 581. <https://doi.org/10.4102/rw.v16i1.581>
- Ehri, L. C. (2022). What teachers need to know and do to teach letter-sounds, phonemic awareness, word reading, and phonics. *The Reading Teacher*, 76(1), 53–61. <https://doi.org/10.1002/trtr.2095>
- Ekmekci, A., & Serrano, D. M. (2022). The impact of teacher quality on student motivation, achievement, and persistence in science and mathematics. *Education Sciences*, 12(10). <https://doi.org/10.3390/educsci12100649>
- Garcia, M. B. (2020). Kinder learns: An educational visual novel game as knowledge enhancement tool for early childhood education. *The International Journal of Technologies in Learning*, 27(1), 13–34. <https://doi.org/10.18848/2327-0144/CGP/v27i01/13-34>
- Hava, K. (2021). Exploring the role of digital storytelling in student motivation and satisfaction in EFL education. *Computer Assisted Language Learning*, 34(7), 958–978. <https://doi.org/10.1080/09588221.2019.1650071>
- Iliska, D., & Gudoniene, D. (2025). Sustainable technology-enhanced learning for learners with dyslexia. *Sustainability*, 17(10). <https://doi.org/10.3390/su17104513>
- Kennedy, U., & Chinokul, S. (2020). Effect of the scaffolded reading experience using a graphic novel on the English reading comprehension and reading motivation of Thai EFL students. *LEARN Journal: Language Education and Acquisition Research Network*, 13(2), 158–175.
- Kidd, E., & Donnelly, S. (2020). Individual differences in first language acquisition. *Annual Review of Linguistics*, 6, 319–340. <https://doi.org/10.1146/annurev-linguistics-011619-030326>
- Kieffer, M. J., & Christodoulou, J. A. (2020). Automaticity and control: How do executive functions and reading fluency interact in predicting reading comprehension? *Reading Research Quarterly*, 55(1), 147–166. <https://doi.org/10.1002/rrq.289>
- Kim, J. S., Burkhauser, M. A., Mesite, L. M., Asher, C. A., Relyea, J. E., Fitzgerald, J., & Elmore, J. (2021). Improving reading comprehension, science domain knowledge, and reading engagement through a first-grade content literacy intervention. *Journal of Educational Psychology*, 113(1), 3–26. <https://doi.org/10.1037/edu0000465>
- Lane, H. B., Contesse, V. A., Gage, N. A., & Burns, M. K. (2025). Effect of an instructional program in foundational reading skills on early literacy development of students in kindergarten and first grade. *Reading Research Quarterly*, 60(1), e607. <https://doi.org/10.1002/rrq.607>
- Li, L., & Liu, Y. (2022). An integrated model of principal transformational leadership and teacher leadership that is related to teacher self-efficacy and student academic performance. *Asia Pacific Journal of Education*, 42(4), 661–678. <https://doi.org/10.1080/02188791.2020.1806036>
- Li, X., & Chu, S. K. W. (2021). Exploring the effects of gamification pedagogy on children's reading: A mixed-method study on academic performance, reading-related mentality and behaviors, and sustainability. *British Journal of Educational Technology*, 52(1), 160–178. <https://doi.org/10.1111/bjet.13057>
- Liou, S.-R., Cheng, C.-Y., Chu, T.-P., Chang, C.-H., & Liu, H.-C. (2023). Effectiveness of differentiated instruction on learning outcomes and learning satisfaction in the evidence-based nursing

- course: Empirical research quantitative. *Nursing Open*, 10(10), 6794–6807. <https://doi.org/10.1002/nop2.1926>
- Lohvansuu, K., Torppa, M., Ahonen, T., Eklund, K., Hämäläinen, J. A., Leppänen, P. H. T., & Lyytinen, H. (2021). Unveiling the mysteries of dyslexia: Lessons learned from the prospective Jyväskylä longitudinal study of dyslexia. *Brain Sciences*, 11(4). <https://doi.org/10.3390/brainsci11040427>
- Martins, M. A., & Capellini, S. A. (2021). Identification of struggling readers or at risk of reading difficulties with one-minute fluency measures. *Psicologia: Reflexão e Crítica*, 34, Article 10. <https://doi.org/10.1186/s41155-021-00174-z>
- Mascheretti, S., Luoni, C., Franceschini, S., Capelli, E., Farinotti, L., Borgatti, R., Lecce, S., & Termine, C. (2024). Development and predictors of reading skills in a 5-year Italian longitudinal study. *Infant and Child Development*, 33(6), e2542. <https://doi.org/10.1002/icd.2542>
- McBreen, M., & Savage, R. (2021). The impact of motivational reading instruction on the reading achievement and motivation of students: A systematic review and meta-analysis. *Educational Psychology Review*, 33(3), 1125–1163. <https://doi.org/10.1007/s10648-020-09584-4>
- Nevo, E., & Vaknin-Nusbaum, V. (2020). Enhancing motivation to read and reading abilities in first grade. *Educational Psychology*, 40(1), 22–41. <https://doi.org/10.1080/01443410.2019.1635680>
- Newell, K. W., Coddling, R. S., & Fortune, T. W. (2020). Oral reading fluency as a screening tool with English learners: A systematic review. *Psychology in the Schools*, 57(8), 1208–1239. <https://doi.org/10.1002/pits.22406>
- Oakley, G., Wildy, H., & Berman, Y. (2020). Multimodal digital text creation using tablets and open-ended creative apps to improve the literacy learning of children in early childhood classrooms. *Journal of Early Childhood Literacy*, 20(4), 655–679. <https://doi.org/10.1177/1468798418779171>
- Park, E. J. (2021). Affordances and challenges of mixed-methods needs analysis for the development of ESP courses. *Language Teaching Research Quarterly*, 23, 12–22. <https://doi.org/10.32038/ltrq.2021.23.03>
- Porter, S. B., Odegard, T. N., Farris, E. A., & Oslund, E. L. (2024). Effects of teacher knowledge of early reading on students' gains in reading foundational skills and comprehension. *Reading and Writing*, 37(8), 2007–2023. <https://doi.org/10.1007/s11145-023-10448-w>
- Pratiwi, D. I., & Waluyo, B. (2023). Autonomous learning and the use of digital technologies in online English classrooms in higher education. *Contemporary Educational Technology*, 15(2). <https://doi.org/10.30935/cedtech/13094>
- Robertson, D. A., & Padesky, C. J. (2020). Keeping students interested: Interest-based instruction as a tool to engage. *The Reading Teacher*, 73(5), 575–586. <https://doi.org/10.1002/trtr.1880>
- Rupley, W. H., Nichols, W. D., Rasinski, T. V., & Paige, D. (2020). Fluency: Deep roots in reading instruction. *Education Sciences*, 10(6). <https://doi.org/10.3390/educsci10060155>
- Sedova, K., & Navratilova, J. (2020). Silent students and the patterns of their participation in classroom talk. *Journal of the Learning Sciences*, 29(4–5), 681–716. <https://doi.org/10.1080/10508406.2020.1794878>
- Segundo Marcos, R. I., López Fernández, V., Daza González, M. T., & Phillips-Silver, J. (2020). Promoting children's creative thinking through reading and writing in a cooperative learning classroom. *Thinking Skills and Creativity*, 36, 100663. <https://doi.org/10.1016/j.tsc.2020.100663>
- Setyawan, F. B., Priambadha, A. A., Sofyan, I., Susanto, B. H., Rohani, N., Astuti, D. T., & Chun, A. C. (2026). Needs analysis for designing and developing a traditional games application to enhance psychomotor and cognitive skills in inclusive elementary education. *Journal of Teaching and Learning*, 20(2), 74–96. <https://doi.org/10.22329/jtl.v20i2.10219>
- Shafiee Rad, H. (2025). Reinforcing L2 reading comprehension through artificial intelligence intervention: Refining engagement to foster self-regulated learning. *Smart Learning Environments*, 12(1), 23. <https://doi.org/10.1186/s40561-025-00377-2>
- Share, D. L. (2025). Blueprint for a universal theory of learning to read: The combinatorial model. *Reading Research Quarterly*, 60(2), e603. <https://doi.org/10.1002/rrq.603>

- Sharma, V. B., Tewari, S., Biswas, S., & Sharma, A. (2024). A comprehensive study of techniques utilized for structural health monitoring of oil and gas pipelines. *Structural Health Monitoring*, 23(3), 1816–1841. <https://doi.org/10.1177/14759217231183715>
- Siegner, A., & Stapert, N. (2020). Climate change education in the humanities classroom: A case study of the Lowell school curriculum pilot. *Environmental Education Research*, 26(4), 511–531. <https://doi.org/10.1080/13504622.2019.1607258>
- Silinskas, G., Sénéchal, M., Torppa, M., & Lerkkanen, M.-K. (2020). Home literacy activities and children's reading skills, independent reading, and interest in literacy activities from kindergarten to Grade 2. *Frontiers in Psychology*, 11. <https://doi.org/10.3389/fpsyg.2020.01508>
- Soto, C. (2026). Automated reading fluency assessment: A multilayer educational framework for scalable literacy evaluation. *Reading Psychology*, 1–12. <https://doi.org/10.1080/02702711.2026.2692349>
- Spaull, N., Pretorius, E., & Mohohlwane, N. (2020). Investigating the comprehension iceberg: Developing empirical benchmarks for early-grade reading in agglutinating African languages. *South African Journal of Childhood Education*, 10(1), 1–14. <https://doi.org/10.4102/sajce.v10i1.773>
- Syal, S., & Nietfeld, J. L. (2024). Examining the effects of a game-based learning environment on fifth graders' reading comprehension and reading motivation. *Journal of Educational Psychology*, 116(5), 805–819. <https://doi.org/10.1037/edu0000874>
- Syawaluddin, A., Afriani Rachman, S., & Khaerunnisa. (2020). Developing snake ladder game learning media to increase students' interest and learning outcomes on social studies in elementary school. *Simulation & Gaming*, 51(4), 432–442. <https://doi.org/10.1177/1046878120921902>
- Szenczi, B., Fejes, J. B., Vígh, T., Hódi, Á., & Tary, B. (2024). Home reading support in grades four, six, and eight: Does student reading motivation matter? *Reading & Writing Quarterly*, 40(5), 489–511. <https://doi.org/10.1080/10573569.2023.2286960>
- Val, S., & Quintas, A. (2025). Key performance indicators for optimizing academic performance and course design in online educational platforms. *Cogent Education*, 12(1), Article 2529420. <https://doi.org/10.1080/2331186X.2025.2529420>
- Wang, X., Jia, L., & Jin, Y. (2020). Reading amount and reading strategy as mediators of the effects of intrinsic and extrinsic reading motivation on reading achievement. *Frontiers in Psychology*, 11. <https://doi.org/10.3389/fpsyg.2020.586346>
- Wei, Y., Spear-Swerling, L., & Mercurio, M. (2021). Motivating students with learning disabilities to read. *Intervention in School and Clinic*, 56(3), 155–162. <https://doi.org/10.1177/1053451220928956>
- Wilde, V. D., Brysbaert, M., & Eyckmans, J. (2021). Young learners' L2 English after the onset of instruction: Longitudinal development of L2 proficiency and the role of individual differences. *Bilingualism: Language and Cognition*, 24(3), 439–453. <https://doi.org/10.1017/S1366728920000747>
- Wyse, D., & Hacking, C. (2024). Decoding, reading and writing: The double helix theory of teaching. *Literacy*, 58(3), 256–266. <https://doi.org/10.1111/lit.12367>
- Yang, G., Chen, Y.-T., Zheng, X.-L., & Hwang, G.-J. (2021). From experiencing to expressing: A virtual reality approach to facilitating pupils' descriptive paper writing performance and learning behavior engagement. *British Journal of Educational Technology*, 52(2), 807–823. <https://doi.org/10.1111/bjet.13056>
- Zhang, S.-Z., Inoue, T., Shu, H., & Georgiou, G. K. (2020). How does home literacy environment influence reading comprehension in Chinese? Evidence from a 3-year longitudinal study. *Reading and Writing*, 33(7), 1745–1767. <https://doi.org/10.1007/s11145-019-09991-2>
- Zhang, X., Lau, C., & Su, Y. (2023). Home environment and development of English as a second/foreign language for young children in Asian contexts: A systematic review and meta-analysis. *Early Education and Development*, 34(1), 274–305. <https://doi.org/10.1080/10409289.2021.1981065>