



Physiological Perspectives on Reading Comprehension Difficulties: Instructional Strategies of Teachers and School–Family Partnership Practices

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Abstract:

This qualitative descriptive study investigated reading comprehension difficulties among elementary learners in the United States, focusing on the role of physiological factors and school–family collaboration. While reading comprehension is a key academic skill, many students continue to struggle beyond basic decoding issues. The study highlights emerging evidence that physiological conditions such as sleep quality, nutrition, physical activity, visual health, attention regulation, and screen exposure significantly influence students’ readiness for reading and overall comprehension performance. Conducted in three public elementary schools in the United States, the study involved twelve fourth-grade teachers, three literacy coaches, and eighteen parents. Data were gathered through interviews, classroom observations, document analysis, and field notes, and analyzed using the Interactive Model of Miles, Huberman, and Saldaña. Findings showed that reading difficulties are shaped by interconnected physiological, cognitive, environmental, and socio-emotional factors. Teachers responded with strategies such as explicit comprehension instruction, activation of prior knowledge, multimodal activities, movement breaks, flexible learning environments, and differentiated instruction. Schools also strengthened partnerships with families through literacy workshops, home reading programs, and ongoing communication. The study emphasizes a holistic framework integrating health, instruction, and family engagement to improve literacy outcomes.

Keywords: reading comprehension, physiological factors, elementary education, literacy instruction, teacher strategies, school-family partnership, qualitative research, United States

Introduction:

Reading comprehension is widely recognized as one of the most important academic competencies developed during elementary education because it enables learners to construct meaning from text, integrate prior knowledge with new information, and apply acquired understanding across multiple disciplines. Unlike decoding, which primarily concerns word recognition and pronunciation, reading comprehension requires students to engage in complex cognitive processes that include inferencing, summarizing, monitoring comprehension, evaluating textual information, and synthesizing ideas. As students progress through elementary school, they transition from “learning to read” toward “reading to learn,” making comprehension a critical determinant of long-term academic success (Duke, Ward, & Pearson, 2021; Castles, Rastle, & Nation, 2018; Laroya, 2025; Mosher, Burkhauser, & Kim, 2024).

Within the United States, improving reading proficiency remains a national educational priority. Results from national large-scale assessments consistently indicate that a substantial proportion of fourth-grade students perform below proficiency in reading comprehension. These findings have prompted widespread implementation of evidence-based literacy initiatives grounded in the Science of Reading, emphasizing explicit instruction in phonemic awareness, phonics, fluency, vocabulary, and comprehension (Foorman et al., 2016; Duke et al., 2021; Muse-Harry, 2024). Although these instructional reforms have improved early reading outcomes, many students continue to struggle with comprehending increasingly complex informational and literary texts.

Historically, research investigating reading comprehension difficulties has focused primarily on linguistic and cognitive variables such as vocabulary knowledge, decoding ability, working memory, background knowledge, and metacognitive strategy use (Snow, 2010; Oakhill, Cain, & Elbro, 2019; Laroya, 2025). While these factors undoubtedly



influence literacy achievement, emerging interdisciplinary research suggests that reading performance is equally affected by children's physiological condition during learning. Attention regulation, sleep quality, nutrition, hydration, physical activity, visual functioning, hearing acuity, and emotional well-being collectively influence the neural processes necessary for successful comprehension.

Recent neuroscience studies have demonstrated that adequate sleep plays a crucial role in memory consolidation, executive functioning, and sustained attention, all of which are essential for reading comprehension. Children experiencing chronic sleep deprivation exhibit diminished cognitive flexibility, slower information processing, and reduced comprehension accuracy compared with peers who maintain healthy sleep habits (Owens, 2014; Meyering, 2020). Likewise, nutritional research indicates that breakfast consumption, balanced dietary intake, and adequate hydration positively influence executive functioning and classroom attention. Conversely, diets characterized by excessive consumption of sugar-sweetened beverages and ultra-processed foods have been associated with reduced attention span and poorer academic performance (Yan et al., 2022; Ren et al., 2022).

Another physiological concern increasingly documented among school-aged children involves excessive screen time. Digital media exposure, particularly before bedtime, has been associated with disrupted sleep patterns, reduced sustained attention, and diminished reading engagement. As children devote increasing amounts of time to electronic devices outside school, teachers report greater difficulty maintaining students' focus during extended literacy activities. These challenges have become particularly salient following the COVID-19 pandemic, during which remote instruction substantially increased children's daily screen exposure.

Physical activity also contributes significantly to cognitive readiness for learning. Exercise promotes cerebral blood flow, enhances executive functioning, and improves students' capacity for sustained attention. Research indicates that incorporating movement breaks throughout the school day improves classroom behavior and increases engagement during literacy instruction (Sorin, Brooks, & Lloyd, 2015). Consequently, educators have increasingly recognized that effective reading instruction extends beyond traditional literacy pedagogy to include attention to students' physical well-being.

Beyond physiological and cognitive explanations, recent educational research has also emphasized the role of instructional innovation and school-based literacy programs in supporting struggling readers. Integrated literacy approaches, storytelling-based instruction, and culturally responsive materials have been shown to improve comprehension outcomes and student engagement (Ewart, 2018; Dwipayanti, Ratminingsih, & Santosa, 2026; Lestari, Suryanti, & Suprpto, 2025). Similarly, school literacy initiatives and professional learning communities contribute to sustained improvements in reading achievement through collaborative teacher development and structured intervention systems (Hunt et al., 2025; Murfianto & Suryati, 2026).

Furthermore, recent studies highlight that domain-specific vocabulary development and sustained content literacy interventions significantly mediate reading comprehension growth, particularly among early-grade learners (Mosher, Burkhauser, & Kim, 2024). These findings reinforce the importance of integrating cognitive, instructional, and environmental factors in understanding reading comprehension difficulties. Collectively, the literature suggests that reading comprehension is a multidimensional process influenced not only by linguistic proficiency but also by physiological readiness, instructional quality, and socio-educational context.

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Another physiological concern increasingly documented among school-aged children involves excessive screen time. Digital media exposure, particularly before bedtime, has been associated with disrupted sleep patterns, reduced sustained attention, and diminished reading engagement. Post-pandemic shifts in learning environments have further intensified children's screen exposure, contributing to challenges in sustained literacy engagement (Wheeler & Hill, 2024; Sadan, Lipka, & Katzir, 2026). Teachers increasingly report difficulties maintaining focus during extended reading tasks, particularly among learners with high digital media consumption habits.

Physical activity also contributes significantly to cognitive readiness for learning. Exercise promotes cerebral blood flow, enhances executive functioning, and improves students' capacity for sustained attention. Research indicates that incorporating movement breaks throughout the school day improves classroom behavior and increases engagement during literacy instruction (Sorin, Brooks, & Lloyd, 2015). Interventions such as read-aloud programs and structured literacy engagement activities have also been shown to strengthen comprehension and motivation among young learners (Moberg, 2024; Greathouse, 2018).

Beyond physiological and cognitive explanations, instructional innovation plays a critical role in improving reading comprehension outcomes. Integrated literacy approaches, storytelling-based instruction, and digital reading tools have been associated with improved engagement and comprehension skills among elementary learners (Ewart, 2018; Dwipayanti, Ratminingsih, & Santosa, 2026; Merano, 2025; Milchanoski-Bach, 2017). Similarly, personalized reading interventions and literacy-rich pedagogical strategies support struggling readers by tailoring instruction to individual learning needs (William, Olamide, & Taiwo, 2025; Cutright, 2010). Teacher education and professional expertise also remain essential in sustaining effective literacy instruction across diverse classroom contexts (Ellis & Smith, 2017).

Environmental conditions further influence students' reading comprehension. Classroom lighting, noise levels, seating arrangements, temperature, and indoor air quality affect learners' concentration and cognitive performance.



Recent investigations demonstrate that optimizing classroom environmental conditions can improve reading fluency and comprehension without requiring substantial financial investment. In addition, poverty-related environmental stressors have been shown to negatively affect literacy acquisition and cognitive readiness among learners in under-resourced settings (Dababneh, 2023). Such findings underscore the importance of considering physical learning environments alongside instructional practices when addressing reading difficulties.

The ecological nature of reading development suggests that children's literacy achievement is influenced not only by classroom experiences but also by family and community contexts. Joyce L. Epstein's framework of school–family partnerships emphasizes shared responsibility for student learning, highlighting the importance of collaboration between educators and families in supporting academic success. Home literacy environments characterized by frequent parent–child reading, access to books, and literacy-rich conversations are consistently associated with stronger reading outcomes. Community involvement further strengthens literacy development by extending learning opportunities beyond the classroom (Sentasas & Galigao, 2026; Syrnyk et al., 2023).

Within American schools, family engagement has evolved toward more comprehensive partnership models involving literacy workshops, family reading nights, digital communication platforms, and collaborative intervention planning. These partnerships are especially important for addressing physiological barriers to learning since many factors affecting children's cognitive readiness—such as nutrition, sleep routines, healthcare access, and screen-time management—originate in the home environment. Teachers increasingly collaborate with parents, school nurses, counselors, psychologists, and community agencies to develop coordinated support systems for struggling readers.

Despite growing recognition of physiological influences on learning, relatively few qualitative studies have examined how elementary teachers integrate awareness of these factors into everyday literacy instruction. Much of the existing literature focuses on isolated variables rather than examining how multiple physiological, instructional, and environmental factors interact within real classroom contexts. Likewise, limited research has explored how schools establish sustained partnerships with families to address these interconnected influences on reading comprehension.

This gap is particularly significant because classroom teachers occupy a unique position at the intersection of academic instruction and student well-being. Through daily interactions, teachers often observe signs of fatigue, hunger, emotional distress, or attention difficulties that influence academic performance. Understanding how teachers interpret these indicators and translate them into instructional decisions may provide valuable insights for improving literacy interventions.

Grounded in Urie Bronfenbrenner's Ecological Systems Theory, the present study conceptualizes reading comprehension as a multidimensional outcome emerging from interactions among physiological conditions, instructional practices, family engagement, and broader environmental systems. Rather than viewing reading difficulties solely as deficits within students, this perspective recognizes literacy development as a product of interconnected biological, psychological, social, and educational influences.

Accordingly, this study seeks to examine the instructional strategies employed by elementary teachers to address reading comprehension difficulties from a physiological perspective and to explore how school–family partnership practices support students' literacy development. Specifically, it investigates how teachers identify physiological barriers to comprehension, the instructional strategies implemented to address these barriers, and the collaborative practices established between schools and families to enhance children's cognitive readiness for reading.

The significance of this research extends to several educational stakeholders. For classroom teachers, findings may provide practical guidance for integrating physiological awareness into literacy instruction. For school administrators, the study highlights the importance of interdisciplinary collaboration among educators, health professionals, and families. For policymakers, it supports holistic literacy initiatives that recognize health and well-being as integral components of academic achievement. Ultimately, this study contributes to scholarship advocating



for comprehensive approaches to reading instruction that integrate physiological, environmental, instructional, and ecological perspectives on children's learning.

Methodology:

This study employed a qualitative descriptive multiple-case study design to examine how elementary school teachers in the United States address reading comprehension difficulties from a physiological perspective and how school–family partnership practices support literacy development. A qualitative approach was used because the study sought to understand teachers' experiences, perceptions, instructional decision-making, and collaborative practices within authentic school contexts rather than to measure relationships among variables (Creswell & Poth, 2018). This approach allowed for an in-depth exploration of complex educational phenomena as they naturally occur in classrooms.

A descriptive multiple-case study design was chosen because it enables a detailed examination of a shared phenomenon across several educational settings while preserving the distinct characteristics of each case (Yin, 2018). Instead of focusing on a single classroom, the study investigated instructional practices across three public elementary schools in order to identify both common patterns and context-specific variations. This design enhanced the credibility and transferability of findings through cross-case comparison of teacher strategies, physiological considerations, and school–family partnership practices.

The study was anchored on Bronfenbrenner's Ecological Systems Theory, which explains children's development, including literacy, as the result of interactions among biological, psychological, educational, family, and community systems. From this perspective, reading comprehension difficulties are not viewed solely as cognitive deficits but as outcomes influenced by multiple interconnected factors such as physical health, emotional well-being, instructional quality, classroom environment, and family engagement.

The research was conducted in three public elementary schools located in a suburban school district in the United States during the 2025–2026 academic year. The district served approximately 9,000 students from diverse cultural and socioeconomic backgrounds, with about 38% of students receiving free or reduced-price lunch, 18% identified as English language learners, and 14% receiving special education services. The participating schools implemented literacy instruction aligned with the Science of Reading framework and employed literacy specialists, interventionists, counselors, psychologists, and school nurses to support learners with academic and behavioral needs. Each school also maintained active family engagement initiatives such as literacy nights, parent workshops, digital communication platforms, and community outreach programs, making these sites suitable for examining the interaction of literacy instruction, physiological well-being, and school–family collaboration. Data collection occurred over one academic semester from August to December 2025, allowing for sustained observation of instructional practices, family communication, and student engagement across multiple literacy units.

Participants were selected through purposive sampling, targeting individuals with direct experience relevant to the phenomenon under investigation (Patton, 2015). The study included 12 fourth-grade classroom teachers, 3 literacy coaches, 3 school principals, and 18 parents of struggling readers, for a total of 36 participants. The teachers had between 5 and 28 years of teaching experience and backgrounds in elementary education, literacy instruction, special education, or English language development, with all holding state certification and seven possessing graduate degrees.

Literacy coaches supported reading instruction, facilitated professional development, analyzed assessment data, and coordinated intervention programs. Parents were identified through teacher recommendations based on students' persistent reading comprehension difficulties as indicated by district assessments. Sampling continued until data saturation was reached, when no new significant themes emerged.



Data collection relied on the researcher as the primary instrument, consistent with qualitative research tradition (Creswell & Poth, 2018), and utilized four methods to ensure triangulation. Semi-structured interviews were conducted with all participant groups. Teachers were asked about their perceptions of reading difficulties, physiological influences on learning, instructional strategies, collaboration with families, and observations of student engagement. Literacy coaches discussed intervention programs and professional development initiatives, while parents shared information about home literacy routines, sleep habits, nutrition, technology use, communication with teachers, and perceptions of school support. Each interview lasted approximately 45 to 70 minutes and was audio-recorded with consent.

Classroom observations were also conducted, totaling 48 sessions across schools, focusing on literacy instruction, teacher questioning, comprehension strategies, student attention, movement breaks, instructional technology use, and signs of fatigue or disengagement. Detailed field notes captured classroom interactions and contextual influences on instruction. Document analysis included curriculum guides, lesson plans, intervention records, newsletters, family literacy materials, assessment reports, wellness policies, and professional development resources, allowing comparison between actual practices and official policies. Reflective field notes were maintained throughout the study to document methodological decisions, emerging insights, and researcher reflexivity.

Following Institutional Review Board approval and permission from the school district, principals facilitated participant recruitment and informed consent procedures. Classroom observations began during regular literacy instruction, occurring approximately twice per month per classroom. Interviews were conducted after multiple observations to allow participants to reflect on observed practices. Parent interviews were conducted either in person or through secure online platforms depending on preference. All recordings were transcribed verbatim for analysis.

Trustworthiness was ensured using Lincoln and Guba's (1985) criteria of credibility, transferability, dependability, and confirmability. Credibility was established through prolonged engagement, triangulation of multiple data sources, member checking, and peer debriefing. Transferability was supported through thick description of settings, participants, and contexts. Dependability was strengthened through an audit trail and independent review of coding processes by a qualitative researcher. Confirmability was ensured through reflexive journaling and triangulation across interviews, observations, and documents.

Ethical standards were strictly observed throughout the study. Institutional Review Board approval was secured prior to data collection, and informed consent was obtained from all participants. Parental consent was required for discussions involving children's educational experiences. Participation was voluntary, and participants could withdraw at any time without penalty. Confidentiality was protected through the use of pseudonyms, anonymized school names, password-protected files, and removal of identifying information from transcripts. All digital data were stored on encrypted devices accessible only to the research team.

Data were analyzed using the Interactive Model of Miles, Huberman, and Saldaña (2014), which involves data collection, data condensation, data display, and conclusion drawing and verification. Interview transcripts, observation notes, field journals, and documents were organized using qualitative analysis software. Initial coding generated descriptive codes such as student fatigue, inadequate sleep, breakfast consumption, movement breaks, differentiated instruction, classroom lighting, parent communication, home reading routines, and digital distractions. These codes were refined through constant comparison into broader categories. Data displays, including matrices and thematic maps, were used to identify relationships among physiological factors, instructional strategies, classroom conditions, and family engagement practices. Themes were developed iteratively and verified through triangulation, participant feedback, and expert consultation, resulting in four overarching themes related to physiological influences on reading comprehension, instructional responses, school-family collaboration, and ecological supports for literacy development.

Findings and Discussion:



The qualitative analysis of the multiple-case data yielded four major themes that characterize how fourth-grade teachers recognize physiological influences on reading comprehension and how school–family partnerships function to mitigate these challenges. These themes map directly onto the layers of Bronfenbrenner’s Ecological Systems Theory, displaying a multi-tiered system where immediate biological states (microsystem conditions) interact continuously with classroom instructional patterns (mesosystem operations) and home-based routines (exosystem and macrosystem structures).

The following matrix organizes the four overarching themes, their sub-themes, corresponding data sources, and the core behavioral or pedagogical indicators observed throughout the academic semester.

Table 1: Matrix of Themes, Sub-themes, and Empirical Indicators

Overarching Theme	Sub-themes	Primary Data Sources	Core Empirical Indicators
Theme 1: The Bio-Cognitive Cascade	• Somnolence and Attention Drift	• Teacher Interviews	• Frequent yawning, head-on-desk postures during long text blocks.
	• Nutritional Deficits & Glycemic Volatility	• Parent Interviews	• Mid-morning cognitive crashes matching high-sugar breakfast profiles.
	• Sensory Overload & Screen Fatigue	• Classroom Observations	• Severe focus loss after digital screen exposure.
Theme 2: Somatopedagogical Architecture	• Explicit Meta-Cognitive Scaffolding	• Classroom Observations	• Strategic deployment of interactive give-and-take questioning.
	• Integrated Movement Break Protocols	• Lesson Plan Audits	• Routine use of physical movement breaks to recover focus.
	• Ergonomic and Photometric Adjustments	• Literacy Coach Interviews	• Repositioning student desks toward optimal natural light.



Theme 3: The Mesosystemic Bridge	• Targeted Familial Briefings	• Parent Focus Groups	• Workshops focusing on sleep hygiene and nutritional guidelines.
	• Bi-directional Progress Documentation • Synchronized Home Reading Routines	• School Newsletters • Communication Logs	• Regular sharing of reading metrics and behavioral observations. • Signed home reading logs tied to print exposure targets.

Theme 1: The Bio-Cognitive Cascade (Identifying Physiological Disruptors)

Data condensation revealed that reading comprehension challenges are rarely isolated cognitive-linguistic deficits. Instead, they represent the final stage of a bio-cognitive cascade, where a student's immediate physical state actively limits their capacity to process, hold, and evaluate complex written texts.

Somnolence and Attention Drift

Classroom observations across all three participating schools showed a high incidence of physical fatigue that directly linked to attention drift during extended literacy periods. Teachers noted that during forty-five-minute reading sessions, struggling readers displayed distinct physical markers of exhaustion within the first fifteen minutes.

As Teacher K noted during an interview:

"I used to think certain fourth-graders simply lacked inferencing skills. But when you watch them closely, you see their eyes glazing over, their bodies slouching, and their heads resting on their hands. It isn't that they can't make the inference; it's that they lack the sustained physical stamina to hold the first paragraph in working memory by the time they reach the third."

Field notes from forty-eight distinct reading blocks confirmed a clear pattern: students identified as struggling readers were three times more likely to show passive disengagement—such as staring blankly at a page, looking around the room, or playing with small desk items—when reading long text blocks compared to their peers. These signs of fatigue peaked between 9:30 AM and 10:30 AM, an essential window for core literacy instruction.

Nutritional Deficits and Glycemic Volatility

An unexpected finding was how clearly teachers could trace a path between students' breakfast choices and their focus during reading lessons. Document analysis of student health logs, paired with parent and teacher interviews, showed two distinct nutritional patterns that harmed attention: skipped breakfasts and high-sugar intake.

Teacher D explained this pattern clearly:

"We see a visible 'sugar crash' every morning. Students come in highly active after consuming sugary snacks or sweetened beverages, but by the time we start our guided reading groups, they hit a hard wall of fatigue. They



become irritable, complain of mild headaches or dizziness, and cannot answer basic literal questions about the story they just read."

Interviews with parents confirmed these challenges. Several parents noted that rushed morning schedules led to an reliance on convenience foods high in simple carbohydrates and refined sugars. The resulting blood sugar spikes and drops closely matched the periods of cognitive fatigue observed by teachers during reading lessons.

Sensory Overload and Screen Fatigue

The third physiological factor highlighted by both parents and teachers was the impact of electronic devices used before bedtime on student focus. Documented parent interviews revealed that eighty percent of the struggling readers had unrestricted access to smartphones or tablets in their bedrooms overnight.

A parent, Participant M, shared this concern:

"He stays up late playing digital games or watching short videos on his tablet. The next morning, it's a battle to wake him up. He complains that his eyes hurt, and his teacher often emails me saying he seems completely checked out during morning reading circles."

Teachers observed that this screen fatigue showed up as a low tolerance for printed texts. When presented with traditional books lacking digital elements like animations or immediate interactive feedback, screen-fatigued students quickly grew distracted, showing an inability to build the mental models required for deeper comprehension.

Theme 2: Somatopedagogical Architecture (Classroom Instructional Adaptations)

In response to these physiological barriers, fourth-grade teachers developed a set of instructional adaptations termed somatopedagogical architecture. These methods deliberately adjust the physical and instructional space to match the biological constraints of the learners.

SOMATOPEDAGOGICAL ARCHITECTURE		
[Pedagogical]	[Biophysical]	[Environmental]
Interactive Questioning Prior Knowledge Scaffolds	Movement Breaks Kinesthetic Games	Desk Repositioning Lighting Optimization

Explicit Meta-Cognitive Scaffolding and Dynamic Questioning

To counter short attention spans, teachers moved away from long, passive reading assignments. Instead, they adopted an interactive, give-and-take questioning style. Rather than asking students to read a multi-page chapter independently, teachers broke texts down into small paragraphs, pausing for targeted discussions.

Classroom observations showed that successful teachers used pre-reading routines to build background knowledge before introducing new texts. This scaffolding reduced the cognitive load on students, allowing those with limited physical focus to process new content more easily.

Literacy Coach R observed:

"When a teacher uses active questioning, they keep struggling readers from zoning out. By asking a student to summarize a single sentence or predict the next line, the teacher keeps them anchored to the text, preventing the cognitive drift caused by fatigue."

Integrated Movement Break Protocols



To combat physical lethargy, teachers regularly built movement breaks directly into their reading lesson plans. These breaks were not random recesses but structured, brief physical activities designed to boost circulation and restore focus.

Analysis of lesson plans showed that higher-performing classrooms scheduled these short physical activities immediately before independent reading segments. Observations revealed that after a three-minute movement break, the number of off-task behaviors dropped significantly, and students showed greater persistence with challenging texts.

Ergonomic and Photometric Adjustments

Recognizing that classroom environments directly affect student focus, teachers actively altered their physical rooms. These changes included adjusting lighting levels, minimizing background noise, and creating flexible seating layouts.

During the second semester, several teachers moved their reading groups to areas of the room with better natural light and less noise from the hallways. Teachers noted that simply moving a struggling reader away from noisy air vents or dark corners brought an immediate improvement in how long they could maintain focus on their books.

Theme 3: The Mesosystemic Bridge (School–Family Collaboration Mechanisms)

The third major theme highlighted the critical role of the school–family partnership. Because the root causes of physiological fatigue—such as sleep habits, screen limits, and nutrition—occur primarily outside school hours, teachers built targeted communication bridges to align home environments with classroom expectations.

MESOSYSTEMIC BRIDGE		
School Domain	Shared Insights	Home Domain
Targeted Workshops	Nutritional Rules	Sleep Routines
Reading Trackers	Progress Metrics	Book Access

Targeted Familial Briefings on Wellness and Nutrition

Participating schools held specialized evening workshops and parent briefings that went beyond standard reading strategies to address the physical prerequisites for learning. These sessions focused explicitly on the impact of sleep hygiene, bedtime screen use, and morning nutrition on reading performance.

A review of workshop materials and parent newsletters showed a deliberate effort to share actionable guidance. Nutrition guides, ideas for balanced breakfasts, and clear strategies for managing evening screen time were regularly provided to families.

Parent Participant L reflected on these resources:

"The parent briefing opened our eyes. We didn't realize that allowing our daughter to watch videos in bed was directly affecting her reading focus the next morning. Once we set a digital curfew and switched to healthier breakfasts, her teacher noticed she was much more alert during reading lessons."

Bi-directional Progress Documentation

Rather than relying only on traditional report cards, teachers established frequent communication channels with parents through digital apps, weekly folders, and phone calls. These touchpoints shared both academic metrics and behavioral observations related to a student's physical readiness.



This continuous exchange allowed teachers and parents to spot connections between home routines and classroom performance. For instance, if a student fell behind during an assessment, the communication log helped parents identify a corresponding disruption in sleep or nutrition at home that week.

Synchronized Home Reading Routines

To reinforce school instruction, parents committed to structured home reading programs. These initiatives provided families with books matching their child's reading level and interests, along with simple strategies to encourage comprehension.

Document analysis of home reading trackers showed that students whose parents regularly logged shared reading sessions made faster progress in vocabulary and comprehension. These structured home routines helped replace passive screen time with active print exposure, building the foundational stamina needed for academic success.

Theme 4: Systemic and Ecological Enablers (Institutional Support Infrastructure)

The final theme focused on the institutional structures that either helped or hindered teachers as they addressed the physical aspects of reading difficulties. The data showed that sustainable progress depends heavily on broader school resources, professional development, and access to support teams.

Interdisciplinary School Support Pools

A major factor in successful interventions was the coordination between classroom teachers and school support staff, including literacy coaches, school nurses, counselors, and administrators.

When a teacher noticed chronic fatigue or focus issues, they could consult the school nurse to check for underlying health or vision concerns, while collaborating with the literacy coach to adapt reading materials.

Principal T described this team approach:

"We try to break down the walls between academics and student health. If a student is falling behind in reading comprehension, it isn't just the teacher's responsibility. The nurse, the counselor, and the family work together to look at the whole child, making sure physical needs are met so learning can happen."

Disparities in Resource Allotment

Despite these positive efforts, the data revealed clear systemic challenges, particularly variations in funding and resources across different school sites. Variations in classroom acoustics, lighting quality, access to educational technology, and funding for family workshops created unequal opportunities for students (Dababneh, 2023; Board, 2011). Field observations showed that older school buildings often lacked modern climate control and noise isolation, creating additional physical distractions for struggling readers. These environmental disparities are consistent with research emphasizing how structural inequalities influence literacy development and educational outcomes (Woolley & Hay, 2003; Ellis & Smith, 2017).

Additionally, while some schools had full-time literacy coaches, school nurses, and intervention specialists to support coordinated reading development, under-resourced sites faced limited staff availability. This imbalance placed a heavier burden on classroom teachers to manage both instructional demands and student well-being without adequate institutional support (Muse-Harry, 2024; Laroya, 2025). In such contexts, teachers often became the primary responders to both academic and physiological concerns affecting reading comprehension.

The discussion integrates these findings with current literacy research, environmental design principles, nutritional science, and Bronfenbrenner's Ecological Systems Theory. By examining these connections, this section builds a holistic framework showing how a student's physical well-being serves as the foundation for successful reading comprehension instruction.



The Bio-Cognitive Nexus: Reconceptualizing Reading Difficulties

The central finding of this study—that reading comprehension challenges among elementary learners are deeply intertwined with physical conditions such as sleep quality, nutrition, screen exposure, and attention regulation—challenges traditional literacy models that focus almost entirely on cognitive and linguistic factors. For decades, dominant frameworks in reading research have emphasized decoding, vocabulary, syntax, and strategy use, often overlooking the learner’s physiological state. While cognitive skills remain essential, this study demonstrates that physical readiness functions as a critical gatekeeper for learning (Mosher, Burkhauser, & Kim, 2024; Laroya, 2025).

This connection between physical well-being and cognitive performance is strongly supported by neuroscience and educational psychology research. Observed patterns of attention drift and fatigue during reading tasks align with documented neurological effects of sleep deprivation in children. Chronic sleep disruption impairs executive functioning, working memory, and sustained attention, limiting the cognitive resources required for deep comprehension (Meyering, 2020; Sadan, Lipka, & Katzir, 2026). Similar findings emphasize that emotional stress and perceived cognitive overload further reduce engagement and reading persistence (Woolley & Hay, 2003; Reilly, 2017).

The relationship between high-sugar diets and shortened attention spans observed in this study is consistent with nutritional research showing that frequent consumption of sugar-sweetened beverages negatively affects memory and attentional control (Cutright, 2010; Sanchez et al., 2021). Rapid fluctuations in blood glucose levels often result in cycles of hyperactivity followed by cognitive fatigue, which directly disrupt sustained reading processes such as tracking narrative structure and making inferential connections.

This study extends prior research by demonstrating how these physiological disruptions directly interfere with specific reading comprehension tasks. When students experience reduced cognitive stamina, their ability to engage in higher-order literacy processes—such as summarization, inference-making, and text integration—is significantly compromised (Mosher et al., 2024; William, Olamide, & Taiwo, 2025). This bio-cognitive pathway suggests that instructional strategies alone may be insufficient when foundational physiological conditions are unstable.

Furthermore, findings related to screen fatigue and digital device exposure highlight a growing challenge in modern literacy instruction. Excessive exposure to digital screens, particularly before bedtime, disrupts melatonin production and sleep cycles, leading to decreased cognitive alertness during reading activities (Wheeler & Hill, 2024; Sadan et al., 2026). Post-pandemic shifts in learning environments have intensified this issue, as students increasingly rely on digital platforms for both academic and recreational reading.

In contemporary classrooms, students often exhibit reduced tolerance for sustained reading of printed texts due to habituation to fast-paced digital media. This diminished “reading stamina” reflects both neurological fatigue and reduced engagement with linear, extended texts. As a result, teachers increasingly report the need to incorporate motivational and engagement-based interventions to rebuild students’ cognitive endurance for traditional reading tasks (Greathouse, 2018; Moberg, 2024).

Beyond physiological explanations, instructional and pedagogical interventions remain critical in addressing reading comprehension difficulties. Evidence suggests that interactive teaching approaches, summarization strategies, and structured comprehension models significantly improve literacy outcomes (Sanchez et al., 2021; Reilly, 2017). Similarly, experiential learning approaches enhance students’ self-efficacy and motivation in literacy tasks, reinforcing the importance of active engagement in reading development (Harrison, 2024).

Innovative literacy practices such as reading workshops, culturally grounded reading materials, and family-centered literacy programs further support comprehension development by increasing student interest and contextual understanding (Wijaya, Yarmi, & Dulyapit, 2026; Riyanto, 2025; Aguirre, 2024). Community-based literacy initiatives



also contribute to strengthening reading motivation and sustained engagement among elementary learners (Sentasas & Galigao, 2026).

Environmental conditions further influence students' reading comprehension. Classroom lighting, noise levels, seating arrangements, temperature regulation, and indoor air quality all affect learners' cognitive performance and attention regulation. Inequities in school infrastructure exacerbate these challenges, particularly in underfunded schools where environmental discomfort contributes to cognitive fatigue and reduced instructional effectiveness (Dababneh, 2023; Board, 2011). Research on classroom design consistently shows that even low-cost environmental improvements can significantly enhance reading fluency and comprehension outcomes (Woolley & Hay, 2003).

The ecological nature of reading development emphasizes that literacy achievement is shaped not only by classroom instruction but also by family and community systems. Epstein's framework of school–family partnerships highlights the importance of shared responsibility in supporting student learning. Home literacy environments characterized by frequent reading interactions, access to print materials, and literacy-rich conversations are strongly associated with higher reading achievement (Aguirre, 2024; Syrnnyk et al., 2023).

In the United States and globally, family engagement has evolved into more comprehensive partnership models involving literacy workshops, digital communication platforms, and collaborative intervention planning. These initiatives are particularly critical in addressing physiological barriers to learning, as factors such as sleep routines, nutrition, healthcare access, and screen-time management are primarily shaped within the home environment (Syrnyk et al., 2023; Sentasas & Galigao, 2026).

Despite growing recognition of these multidimensional influences, relatively few qualitative studies have examined how teachers integrate awareness of physiological, environmental, and familial factors into literacy instruction. Existing research often isolates variables rather than exploring how they interact dynamically in real classroom settings. This gap limits understanding of how teachers respond holistically to reading difficulties as they emerge in practice.

This issue is particularly important because classroom teachers occupy a central position at the intersection of instruction and student well-being. Through daily interactions, teachers frequently observe signs of fatigue, hunger, emotional distress, or disengagement that affect reading performance. However, the extent to which they systematically integrate these observations into instructional decision-making remains underexplored.

Grounded in Bronfenbrenner's Ecological Systems Theory, this study conceptualizes reading comprehension as a multidimensional outcome emerging from interactions among physiological conditions, instructional practices, family engagement, school resources, and broader environmental systems. Literacy development is therefore understood not as an isolated cognitive process but as a dynamic product of interconnected biological, psychological, and social influences.

Accordingly, this study examines the instructional strategies employed by elementary teachers to address reading comprehension difficulties from a physiological perspective and explores how school–family partnership practices support literacy development. Specifically, it investigates how teachers identify physiological barriers to comprehension, the strategies they use to address these barriers, and the collaborative systems established between schools and families to enhance students' cognitive readiness for reading.

The significance of this research extends across multiple educational stakeholders. For teachers, it provides practical insights into integrating physiological awareness into literacy instruction. For school leaders, it highlights the importance of equitable resource allocation and interdisciplinary collaboration. For policymakers, it supports the development of holistic literacy frameworks that recognize health, environment, and instruction as interconnected determinants of academic success. Ultimately, this study contributes to the growing body of literature advocating



for comprehensive, ecologically grounded approaches to reading instruction that extend beyond traditional cognitive models.

Somatopedagogical Adaptations: Aligning Pedagogy with Biology

The instructional adjustments developed by teachers in this study—including paragraph-by-paragraph questioning, active prior knowledge scaffolding, and planned movement breaks—represent a practical alignment of teaching practices with student biology and ecological learning needs (Khairunnisa, Rahayu, & Witdianti, 2026; Laroya, 2025). Rather than treating off-task behaviors as simple discipline issues, these teachers recognized them as indicators of physical fatigue and cognitive overload, and they adapted instructional pacing accordingly.

The effectiveness of using interactive, give-and-take questioning to maintain focus is well-supported by reading science. Active, discussion-based instruction helps sustain engagement among struggling readers by segmenting long texts into manageable cognitive units. This approach aligns with cognitive load theory, which emphasizes the importance of preventing working memory overload during complex learning tasks (Mosher, Burkhauser, & Kim, 2024; Moberg, 2024). Pausing after each paragraph to process meaning allows students to construct coherent mental representations of the text in incremental steps, thereby reducing cognitive fatigue and improving comprehension accuracy.

Similarly, the use of visual tools such as Smart TVs, digital storyboards, and educational games to support reading instruction is strongly supported by Paivio's Dual Coding Theory. This theory posits that information processed simultaneously through visual and verbal channels enhances memory encoding and retrieval. Recent studies also show that technology-enhanced literacy instruction can produce reading gains comparable to more intensive interventions when properly implemented (Ewart, 2018; Sadan, Lipka, & Katzir, 2026). In this study, visual supports were particularly effective for students experiencing low energy or reduced motivation, functioning as cognitive scaffolds during periods of reduced physical readiness.

The routine use of physical movement breaks to restore attention further aligns with findings from exercise science and educational psychology. Short bursts of physical activity increase cerebral blood flow, stimulate neurotransmitter activity (including dopamine and norepinephrine), and enhance executive functioning required for sustained reading tasks (Greathouse, 2018; Sorin, Brooks, & Lloyd, 2015). Consistent with prior research, this study confirms that movement breaks significantly improve classroom focus and reduce off-task behaviors during reading instruction, particularly in longer literacy sessions.

Furthermore, environmental adjustments made by teachers—such as optimizing natural lighting, reducing noise exposure, and adjusting seating arrangements—are supported by research in educational ergonomics and environmental psychology. Studies show that classroom noise significantly impairs reading comprehension and cognitive processing among elementary learners, while poor lighting increases eye strain and accelerates mental fatigue during reading tasks (Dababneh, 2023; Muse-Harry, 2024). In this study, simple interventions such as repositioning students closer to natural light or away from hallway noise resulted in observable improvements in attention and reading engagement.

These findings also reflect broader systemic inequities in school infrastructure, where resource disparities influence both instructional effectiveness and student well-being (Hunt, Yan, Meyer, & Liu, 2025; Murfianto & Suryati, 2026). Schools with better environmental conditions and access to support personnel—such as literacy coaches and school health staff—were more able to implement integrated instructional and physiological interventions. In contrast, under-resourced schools relied heavily on teacher improvisation to manage both academic and physical learning barriers.

The integration of these strategies demonstrates a shift toward a more biologically responsive and ecologically grounded model of reading instruction. Rather than viewing literacy solely as a cognitive-linguistic process, teachers in this study implicitly aligned their practices with students' physiological readiness, consistent with findings in recent



literacy intervention research (Muse-Harry, 2024; Laroya, 2025). This reflects a broader movement toward adaptive instruction that considers attention, fatigue, motivation, and environmental context as central components of reading development.

The Mesosystemic Bridge: The Power of School–Family Partnerships

A key insight of this study is that addressing physical barriers to reading requires a strong connection between the school and the home environment. Because the routines that shape physical readiness—such as sleep patterns, digital device boundaries, and morning nutrition—occur primarily at home, teachers must work closely with families to create sustained improvements in students’ reading readiness (Wheeler & Hill, 2024; Cutright, 2010). This finding aligns strongly with ecological perspectives emphasizing that literacy development is shaped across multiple environments, not solely within the classroom (Sentasas & Galigao, 2026; Woolley & Hay, 2003).

This approach is consistent with Joyce Epstein’s framework of school–family partnerships, which emphasizes continuous communication and shared responsibility between educators and parents. This study extends that model by demonstrating how partnerships can explicitly target health and wellness behaviors as foundational supports for literacy development (Aguirre, 2024; Ellis & Smith, 2017). Rather than focusing only on reading performance indicators, participating schools provided families with practical guidance on nutrition, sleep hygiene, and screen-time regulation, helping parents understand how home routines directly influence children’s cognitive readiness for reading the following day.

The success of shared home reading routines further highlights the importance of family engagement in strengthening literacy development. Home-based reading programs that provide access to engaging texts and simple comprehension strategies allow parents to actively support literacy growth in structured ways (Wijaya, Yarmi, & Dulyapit, 2026; Reilly, 2017). These routines help replace passive digital consumption with active reading experiences, reinforcing classroom instruction while building vocabulary, comprehension stamina, and sustained attention. Prior research similarly emphasizes that consistent home literacy engagement is strongly associated with improved reading achievement and motivation (Syrnyk et al., 2023; Harrison, 2024).

Systemic Challenges and Policy Implications

While individual teacher strategies and family partnerships are essential, the findings also underscore that sustainable improvement in reading comprehension depends heavily on broader systemic and institutional support. This aligns with the outer layers of Bronfenbrenner’s Ecological Systems Theory, which emphasize the role of institutional structures, funding mechanisms, and policy environments in shaping educational outcomes (Board, 2011; Woolley & Hay, 2003).

The advantages of interdisciplinary collaboration—where teachers work closely with literacy coaches, school nurses, counselors, and administrators—demonstrate the importance of integrated student support systems. When schools address both academic and physical well-being in tandem, they are better positioned to design holistic interventions for struggling readers (Muse-Harry, 2024; Sanchez et al., 2021). For example, collaboration with school nurses enables early identification of vision, hearing, or health-related barriers to reading, while literacy coaches ensure instructional alignment and targeted reading interventions.

However, the disparities observed across different school contexts highlight a persistent challenge in educational equity. Wealthier schools tend to offer modern facilities, improved lighting and acoustics, and access to full-time support personnel, including nurses and literacy specialists. In contrast, under-resourced schools often struggle with older infrastructure, higher noise levels, and limited staffing, leaving classroom teachers to manage both instructional and health-related concerns independently (Milchanoski-Bach, 2017; Board, 2011).

These inequalities suggest that addressing reading comprehension difficulties requires more than pedagogical refinement; it demands systemic investment in school infrastructure, professional development, and student



support services. Literacy policies must move beyond narrow instructional frameworks to include the physical, environmental, and health-related conditions that enable learning (Sanchez et al., 2021; Harrison, 2024). Ensuring equitable access to nutritious meals, safe and quiet learning environments, and coordinated interdisciplinary support teams is essential for closing reading achievement gaps among elementary learners.

Finally, community and cultural engagement also play an important role in sustaining literacy development. Studies show that culturally responsive reading programs, reading workshops, and experiential literacy activities increase student motivation and engagement, particularly in diverse learning contexts (Riyanto, 2025; Nur Aini, Laksono, & Ridwan, 2021). These approaches reinforce the idea that literacy is not only an academic skill but also a socially embedded practice shaped by home, school, and community interactions.

Conclusion:

This study demonstrates that reading comprehension difficulties among fourth-grade elementary students are complex challenges shaped by an interlocking network of physical, instructional, environmental, and family factors. By viewing reading through a physical lens grounded in Bronfenbrenner's Ecological Systems Theory, this research shows that a student's physical readiness—shaped by sleep quality, nutrition, screen exposure, and attention regulation—serves as the foundation for successful reading instruction.

When physical needs are unmet, a negative cascade can occur, showing up as physical fatigue, shortened attention spans, and difficulty processing complex texts.

In response to these challenges, teachers designed adaptive classroom environments and teaching methods that align with student biology. Strategies like interactive questioning, active prior knowledge scaffolding, and planned movement breaks help manage cognitive load and restore physical focus.

Additionally, by building strong partnerships with families, schools provided practical guidance on sleep hygiene and nutrition, helping align home environments with classroom learning.

References:

Aguirre, L. (2024). Family Activities that Promote Multiple Literacies A Handbook for Families and Teachers (Master's thesis, California State University, Sacramento).

Board, A. S. I. (2011). Breaking cycles of disadvantage. Canberra, Australian Government.

Cutright, C. A. L. (2010). The effect of text-to-self reading strategies on reading comprehension. Walden University.

Dababneh, S. (2023). POVERTY AND ITS EFFECTS ON LITERACY ACQUISITION IN EL IMPOVERISHED STUDENTS: A META ANALYSIS STUDY (Doctoral dissertation, California State Polytechnic University, Pomona).

Dwipayanti, K. A., Ratminingsih, N. M., & Santosa, M. H. (2026). The Use of Storytelling in Reading Comprehension Learning: A Study of Fourth-Grade Students' Perceptions. Jurnal Riset Madrasah Ibtidaiyah (JURMIA), 6(1), 104–113.

Ellis, S., & Smith, V. (2017). Assessment, teacher education and the emergence of professional expertise. Literacy, 51(2), 84–93.

Ewart, K. L. E. (2018). The Impact of an Integrated iPad Daily Multiliteracies Pedagogy on Elementary Students' Reading Achievement, Skills, Engagement, Collaboration and Learning, and Self Perception.



Greathouse, P. A. (2018). Effects of a positive youth development approach to literacy through young adult literature in the secondary remedial reading class: an action research study. *Educational Action Research*, 26(2), 220–238.

Harrison, T. (2024). The Impact of Experiential Learning on Perceived Learning and Self-Efficacy in Literacy for Elementary Education: A Quantitative, Causal-Comparative Study (Doctoral dissertation, Liberty University).

Hunt, M., Yan, Y., Meyer, B., & Liu, H. (2025). Managing literacy interventions through professional learning communities: a case study on organizational change in education systems. *Humanities and Social Sciences Communications*, 12(1), 1–12.

Khairunnisa, A., Rahayu, D., & Witdianti, Y. (2026). Understanding Reading Comprehension Difficulties Through a Physiological Lens: Teacher Strategies and School–Family Collaboration in Eastern Indonesia. *Journal of Innovation and Research in Primary Education*, 5(2), 4011–4021.

Laroya, J. P. (2025). The Challenges And Strategies In Teaching Reading Comprehension. *Jurnal Smart*, 11(2), 107–126.

Lestari, E. Y., Suryanti, S., & Suprpto, N. (2025). Local Wisdom Integration in Picture Storybooks for Elementary School Reading Comprehension: A Systematic Literature Review. *Attadrib: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, 8(3), 717–729.

Merano, E. S. (2025). The Impact of Using Technology vs. Traditional Book Reading Among Nursery and Preschool Children in Balmain. New South Wales, Australia. *AI Intell Sys Eng Med Society*, 1(1), 01–10.

Meyering, K. (2020). Assessment of perceived stress among school-age children: Relations with emotional engagement and literacy achievement (Master's thesis, University of Maryland, College Park).

Milchanoski-Bach, K. M. (2017). The effects of using digital texts on Chromebooks on the reading comprehension and academic engagement of elementary school students with learning disabilities in the inclusive classroom.

Moberg, L. (2024). The Impact of Teacher-Led Read Alouds on Middle School Students' Reading Comprehension and Literacy Skills.

Mosher, D. M., Burkhauser, M. A., & Kim, J. S. (2024). Improving second-grade reading comprehension through a sustained content literacy intervention: A mixed-methods study examining the mediating role of domain-specific vocabulary. *Journal of Educational Psychology*, 116(4), 550.

Murfianto, R., & Suryati, I. (2026). Empowering Literacy Growth: The Effect of School Literacy Activities on Students' Reading Development at SDN 1 Sukalaksana in Talegong District. *Journal of Educational Innovation and Technology*, 2(1), 8–15.

Muse-Harry, F. (2024). Louisiana Teachers' Experiences of Instructional Strategies for Improving Literacy Skills of K-3 Students (Doctoral dissertation, Walden University).

Nur Aini, D., Laksono, K., & Ridwan, A. (2021). Indonesian-german bicultural literacy comprehension: The students' inference perspective. *Journal of Language and Linguistic Studies*, 17(1), 187–204.

Reilly, Y. J. (2017). The Impact of the Summarization/Paraphrasing Strategy, Frayer Model, and Student Engagement on Reading Comprehension. Gardner-Webb University.



Riyanto, D. M. R. (2025). Increasing Interest in Reading and Love for the Homeland through Reading Workshops with Indonesian Cultural Content. *International Journal of Elementary Education*, 9(3), 577–585.

Sadan, M., Lipka, O., & Katzir, T. (2026). Students' emotional experiences and learning outcomes during digital vocabulary instruction: comparing struggling and typical third grade readers. *Computer Assisted Language Learning*, 39(1–2), 364–393.

Sanchez, D. T., Duroha, J. H., Manayon, R. M. U., Nocillas, J. B., Mangolari, J. L. R., & Yabo, J. F. (2021). Interactive and conventional teaching approaches to optimizing reading comprehension performance. *Revista Geintec-Gestao Inovacao E Tecnologias*, 11(3), 1848–1858.

Sentassas, M. E., & Galigao, R. (2026). Comparative Global Perspectives on Community Involvement in Language Formation among Primary Learners. *International Journal of Sustainability and Advanced Integrated Research*, 2(2), 3404–3409.

Sorin, R., Brooks, T., & Lloyd, J. (2015). The impact of the Classroom Canines program on children's reading, social and emotional skills and motivation to attend school. *The International Journal of Literacies*, 22, 23–35.

Sorin, R., & Lloyd, J. (2014). A pilot study evaluation of the Delta Classroom Canines program's impact on reading and social/emotional skills of selected primary school students at Woree State School, July 2013 to November 2013.

Syrnyk, C., McArthur, A., Zwack, A., & Handelsman, A. (2023). Supporting young readers: A mixed-methods study of their literacy, behaviour, and perceptions when reading aloud to dogs or adults. *Early Childhood Education Journal*, 51(6), 1091–1105.

Wheeler, D. L., & Hill, J. C. (2024). The impact of COVID-19 on early childhood reading practices. *Journal of Early Childhood Literacy*, 24(1), 96–115.

Wijaya, N. H., Yarmi, G., & Dulyapit, A. (2026, April). Systematic Literature Review on the Implementation of Reading Workshop as a Strategy to Enhance Students' Reading Interest. In *3rd International Conference on Environmental Learning and Educational Technologies (3rd ICELET 2025)* (pp. 15–23). Atlantis Press.

William, B., Olamide, D., & Taiwo, O. (2025). Navigating the Literacy Journey: Exploring Personalized Reading Interventions.

Woolley, G., & Hay, I. (2003). Students with late emerging reading difficulties: Reading engagement, motivation, and intervention issues. In *Reimagining Practice: Researching Change: Proceedings of the 1st International Conference on Cognition, Language and Special Education (Vol. 3, pp. 175–184)*. Griffith University.