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Research Article

Integrating Cognitive Processing and Local Wisdom in Literacy Education: A Psycholinguistic Response to Reading Challenges in Gorontalo Primary Schools

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Abstract. *Literacy challenges among primary school students in Gorontalo, Indonesia, show that reading development is shaped by both cognitive and cultural factors. This paper introduces the* ***Cognitive–Cultural Literacy Model (CCLM)****, a conceptual framework that links how the mind processes language with how culture gives meaning to learning. The model integrates key elements of psycholinguistics—such as working memory, phonological awareness, and lexical retrieval—with Gorontalo's local wisdom values of Dulohupa (deliberation), Huyula (mutual cooperation), and Mopotilolo (mutual respect). It argues that reading difficulties in Gorontalo's coastal and rural schools are caused not only by teaching limitations but also by cognitive barriers made worse by multilingual environments and limited reading resources. Through culturally familiar stories and classroom practices, the CCLM helps reduce cognitive load, strengthen comprehension, and make reading more meaningful for learners. Overall, this study contributes to literacy theory by connecting psycholinguistic insights with sociocultural understanding, offering a practical foundation for developing literacy programs that are both cognitively sound and culturally relevant.*

Keywords: *psycholinguistics, cognitive processing, literacy development, local wisdom, Gorontalo, early reading education, cultural pedagogy*

1. Introduction

Literacy development in Indonesia remains uneven, especially among early-grade students living in coastal and peripheral areas. Many of them grow up in multilingual homes, which makes the process of learning to read in Indonesian more demanding. Another reason is the limited access to books and print materials in schools and communities, which weakens reading habits from an early age. Recent data from the Ministry of Education and Culture show

that Gorontalo's reading activity index (ALIBACA) is still at 34.99 percent—below the national average (Nasrullah et al., 2024). The provincial literacy survey also revealed that Gorontalo ranks among the ten lowest regions in reading interest nationwide. These conditions highlight the urgent need for a more context-based approach that links cognitive and cultural dimensions of literacy in Gorontalo's coastal learning environment.

Current literacy programs in Indonesia have mostly focused on improving classroom instruction and teacher performance (Dayantri & Nasution, 2024). While these efforts are necessary, they often overlook how children actually process written language in their minds. In multilingual settings like Gorontalo, children must constantly switch between local and national languages, which increases the mental load of learning to read. Studies in psycholinguistics show that working memory, phonological awareness, and attention control play a major role in determining reading success (Hofer & Spechtenhauser, 2024; Diwansyah et al., 2025). When these internal mechanisms are weak, children struggle to decode and comprehend text efficiently, leading to fatigue and frustration. This situation indicates that literacy problems in Gorontalo are not only about teaching quality but also about how young readers think, process, and make sense of language.

Reading is not merely about recognizing words on a page; it is a mental process that connects sound, meaning, and understanding. This process requires the coordination of several cognitive functions that work together in the reader's mind (Verhoeven et al., 2011). Psycholinguistics explains that reading involves decoding written symbols, comprehending language structures, and integrating meaning from context (Peshkam & Rapp, 2012). Studies show that when these elements function efficiently, readers can understand text fluently and retain information meaningfully. For example, Borkenhagen & Cox (2025) describe this as the interaction between decoding and linguistic comprehension in shaping reading proficiency. Therefore, effective reading can be understood as a mental act of coordination that relies on both linguistic knowledge and cognitive control. When one of these components is weak, comprehension begins to break down and meaning becomes fragmented. Children with poor phonological awareness or limited vocabulary often struggle to connect words to their underlying meaning (Hoover & Tunmer, 2020). Evidence from Scarborough's *Reading Rope* demonstrates that reading success depends on the balance between word recognition and language comprehension (Scarborough, 2001). This balance highlights the intertwined nature of the cognitive and linguistic systems that shape reading development.

Many children in Gorontalo face invisible cognitive barriers that make reading a difficult mental task. These barriers often appear in how learners process and retain language information during reading. Limited working memory capacity, weak phonological awareness,

and difficulty retrieving vocabulary can slow down decoding and comprehension. Research in psycholinguistics shows that working memory plays a central role in holding and manipulating phonological information during reading (Gathercole & Baddeley, 1993a; Gathercole & Baddeley, 1993b; Nouwens et al., 2017; Teng & Cui, 2025). It is also found that children with stronger phonological awareness and vocabulary knowledge perform better in text comprehension tasks (Wang, 2010). These findings suggest that reading problems among young learners are not only external but also linked to the way their minds handle linguistic information.

The challenge becomes even more complex in Gorontalo's multilingual environment. Children must process and switch between multiple languages—Indonesian, Gorontalo, and local dialects—both at home and in school. This linguistic diversity enriches their oral communication but increases the cognitive load required for reading in the national language. UNESCO (2023) reports that multilingual exposure can influence the formation of phonological and semantic representations, sometimes causing interference between oral and written forms. In addition, limited access to books and literacy materials in coastal schools restricts opportunities for vocabulary growth and comprehension development. Therefore, literacy programs in Gorontalo need to consider both the cognitive demands of reading and the realities of multilingual learning, ensuring that instruction supports children's mental processing capacities as well as their linguistic diversity.

The challenge becomes even more complex when reading materials fail to connect with the learners' own world (Hofer & Spechtenhauser, 2024). Many of the texts used in schools ignore local contexts and values that are familiar to Gorontalo children. This cultural gap reduces motivation and weakens comprehension because students cannot easily relate what they read to what they know. Gorontalo, however, possesses strong cultural foundations that can enrich literacy learning. Values such as *Dulohupa* (deliberation), *Huyula* (mutual cooperation), and *Mopotilolo* (mutual respect) embody ways of thinking and communicating that reflect deep social understanding. Integrating these values into classroom texts and discussions helps students read not only with their minds but also with their cultural hearts, turning reading into both a cognitive and moral act.

Reading is never separated from the culture in which it develops. Culture gives meaning to language and influences how people think, learn, and communicate (Kimsanova, 2025; Tahir et al., 2025). In Gorontalo, values such as *Huyula* (mutual cooperation), *Dulohupa* (deliberation), and *Mopotilolo* (mutual respect) shape the way individuals interact and solve problems collectively. These values can become important foundations for literacy learning when reflected in classroom reading materials and discussions. Studies on culturally responsive

pedagogy reveal that when students encounter familiar cultural themes in their texts, they engage more actively and understand the material more deeply (Asfaw & Bulbula, 2022). Therefore, integrating local wisdom into literacy instruction allows reading to become not only a cognitive activity but also an expression of cultural identity and shared values.

From a cognitive perspective, culture can help lighten the mental load of reading. Educational neuroscience suggests that cultural familiarity activates prior knowledge networks in the brain, allowing comprehension to occur more efficiently (Erten & Razi, 2009). It is also emphasised that reading becomes more fluent when the text connects to the reader's experiences and emotional world (List et al., 2023). In Gorontalo's context, the use of culturally relevant stories—such as *Karawo* embroidery or *Mutimualo* ceremonies—helps children relate abstract language to concrete experiences. This alignment between psycholinguistic processing and cultural resonance creates a learning environment where cognition and identity work together. Thus, the integration of cultural meaning into reading instruction forms the heart of the proposed Cognitive–Cultural Literacy Model (CCLM), which aims to connect how children think with who they are as members of their community.

Building on this perspective, the present paper aims to explore how literacy can grow when cognitive and cultural dimensions work together. It seeks to identify the key psycholinguistic barriers that hinder reading development in Gorontalo, and to examine how local wisdom can act as a bridge to improve comprehension and engagement. The paper proposes a Cognitive–Cultural Literacy Model (CCLM) that connects how the brain processes language with how culture gives meaning to it. This model offers a conceptual framework that teachers, policymakers, and researchers can adapt to multilingual and resource-limited settings. By doing so, literacy becomes not only a skill to master but also a reflection of identity, thought, and community in Gorontalo's educational life.

2. Methods

This study is a conceptual paper that develops a theoretical framework through a systematic synthesis of existing literature. The aim is to integrate findings from psycholinguistics, cognitive psychology, and cultural pedagogy to construct a model for literacy instruction in low-resource, multilingual contexts. The methodological approach follows the principles of a narrative literature review, which is appropriate for synthesizing diverse bodies of literature to propose new theoretical insights (Deroncele-Acosta et al., 2025).

A systematic search was conducted across key academic databases, including Scopus, ERIC, and Google Scholar, to identify relevant literature published up to 2025. The search strategy combined keywords related to psycholinguistics (e.g., "working memory",

"phonological awareness", "reading comprehension"), cognitive barriers (e.g., "cognitive load", "multilingual learning"), and cultural pedagogy (e.g., "local wisdom", "culturally responsive teaching", "Gorontalo"). The literature was then analyzed thematically to identify core concepts and their interrelationships.

The synthesis process involved several stages. First, key findings from psycholinguistic research were extracted to establish the cognitive foundations of reading. Second, studies on multilingual learning and cognitive barriers were reviewed to understand the specific challenges faced by learners in contexts like Gorontalo. Third, literature on culturally responsive pedagogy and local wisdom was examined to identify cultural resources that could support literacy. Finally, these three streams of literature were integrated to develop the Cognitive–Cultural Literacy Model (CCLM), ensuring that the model was grounded in empirical evidence and theoretical coherence.

3. Results

The synthesis of literature resulted in the development of the Cognitive–Cultural Literacy Model (CCLM). The model posits that literacy outcomes emerge from the interaction between three core elements: (1) cognitive processing systems, (2) instructional mediation, and (3) cultural ecology. Each of these components plays a distinctive but complementary role in helping learners develop reading fluency, comprehension, and engagement. Cognitive systems provide the mental foundation for decoding and understanding language; instructional mediation represents the teacher's role in scaffolding learning; and cultural ecology supplies the social and emotional environment that gives meaning to what is read. When these tiers operate synergistically, they form a balanced structure that connects how students think, how they are taught, and how they relate reading to their world.

Research in educational psychology supports this triadic relationship. Studies have shown that reading proficiency improves significantly when cognitive skills are reinforced through explicit instruction and grounded in culturally familiar content (Rule et al., 2011; Novita et al., 2023). The CCLM therefore emphasizes literacy as both a cognitive and cultural act—an ongoing process that links mental processing with social understanding. When applied in contexts like Gorontalo, this model helps explain why literacy instruction that aligns with local wisdom and children's lived experiences tends to foster deeper comprehension and sustained motivation. In short, the CCLM proposes that literacy flourishes where cognition, pedagogy, and culture meet in purposeful harmony.

Figure 1 presents a conceptual diagram of the CCLM, illustrating the vertical integration of its three tiers and their dynamic interaction.

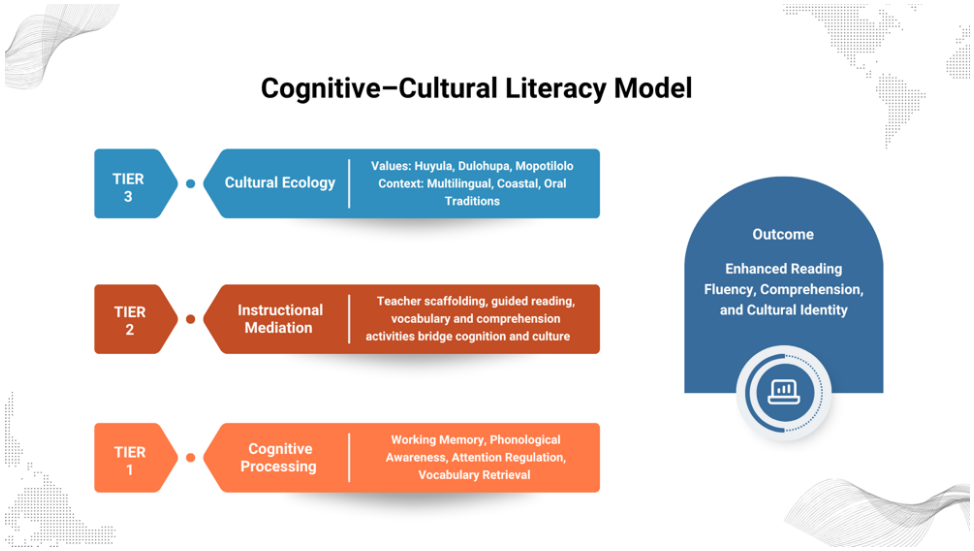

Figure 1. Conceptual Diagram of the Cognitive–Cultural Literacy Model (CCLM)

3.1 Tier 1: Cognitive Processing System

At the foundation of the Cognitive–Cultural Literacy Model (CCLM) lies the learner's psycholinguistic capacity, which determines how efficiently the brain processes written language. Reading requires the coordination of several cognitive functions such as working memory, phonological processing, and attentional control. These functions work together to enable readers to recognize words, store linguistic information, and make meaning from text. When any of these systems are weak, reading becomes a slow and effortful process that drains motivation and focus. Research in cognitive psychology confirms that limited working memory capacity can hinder children's ability to retain phonological information long enough to decode and comprehend sentences (Kibby et al., 2014; Nouwens et al., 2017). Therefore, understanding these mental processes is crucial in helping teachers design literacy activities that match students' cognitive readiness.

To strengthen these underlying processes, teachers can use cognitive scaffolding strategies that lighten the mental load of reading. Techniques such as chunking, repetition, and visualization help students process and store information more effectively. For example, chunking allows readers to group related words into meaningful units, while visualization helps them create mental images that reinforce comprehension. Studies show that these strategies improve automaticity and help build stronger connections between decoding and understanding (Wolf, 2018; Hiebert, 2024). By applying such approaches, literacy instruction becomes more inclusive of how the mind actually works. Thus, the cognitive processing system within the CCLM provides the mental foundation upon which higher levels of instruction and cultural learning can develop in harmony.

3.2 Tier 2: Instructional Mediation

Instruction serves as the bridge that connects the learner's cognitive processes with the cultural context of literacy learning. In the Cognitive–Cultural Literacy Model (CCLM), effective instruction is not just about delivering content but about designing learning experiences that match how students think and process language. Teachers play a central role in mediating this connection by adapting reading materials, pacing, and questioning techniques according to learners' cognitive readiness. When instruction aligns with students' mental capacities, reading becomes less overwhelming and more meaningful. This responsive approach allows teachers to reduce the gap between what students can do independently and what they can achieve with proper supports.

Research on literacy pedagogy highlights that guided reading, vocabulary pre-teaching, and scaffolded discussion can regulate cognitive load and enhance comprehension. These strategies help learners focus their mental energy on building understanding rather than struggling with decoding (Hattan & Alexander, 2018; Córdova Aguilar et al., 2024). For instance, guided reading allows teachers to model comprehension strategies, while vocabulary instruction strengthens semantic networks that support meaning-making. Similarly, scaffolded discussions encourage learners to connect ideas from text with prior knowledge and cultural experiences. When applied consistently, these instructional practices create a classroom environment where cognitive efficiency and cultural relevance reinforce one another. Thus, instructional mediation within the CCLM ensures that teaching becomes a purposeful act of guiding thought, building comprehension, and nurturing cultural awareness simultaneously.

3.3 Tier 3: Cultural Ecology

Culture provides the social and emotional environment where literacy develops and takes meaning. In the Cognitive–Cultural Literacy Model (CCLM), culture is not treated as a background element but as a living system that shapes how students interpret and value what they read. The cultural ecology of Gorontalo, for instance, is rich with local wisdom that promotes cooperation, reflection, and respect. Values such as *Huyula* (mutual cooperation), *Dulohupa* (deliberation), and *Mopotilolo* (mutual respect) are deeply embedded in everyday communication and social interaction. When these values are incorporated into reading activities, they transform literacy learning into an experience that reflects the learner's identity and community life.

Research on culturally responsive literacy supports this integration, showing that students engage more deeply when texts connect to their cultural backgrounds and lived experiences (Asfaw & Bulbula, 2022). In Gorontalo, local stories, folklore, and traditions—such as *Karawo* embroidery or *Mutimualo* rituals—can serve as authentic materials that bridge

cognitive learning with cultural meaning. Educational neuroscience further explains that familiar and emotionally resonant contexts reduce cognitive load, helping learners process and retain information more effectively (Pera, 2014; Angchuk, 2022; González-Ramírez, 2023). This alignment between mind and culture allows reading to become both a mental exercise and a form of self-expression. Therefore, within the CCLM framework, cultural ecology acts as the sustaining force that connects thinking, feeling, and belonging—making literacy not only an intellectual achievement but also a cultural journey.

4. Results

The strength of the Cognitive–Cultural Literacy Model (CCLM) lies in the way its three tiers—cognitive processing, instructional mediation, and cultural ecology—work together as a unified system. Each tier contributes a different function, yet none can stand alone. Cognitive processing provides the mental mechanism for decoding and understanding language, while instructional mediation ensures that teaching practices guide and support those mental processes. Cultural ecology, on the other hand, gives meaning and identity to the act of reading by situating it within the learner's social world. When these tiers operate interactively, literacy becomes not only a technical skill but a deeply human activity that reflects both thought and culture.

Evidence from educational and psycholinguistic research supports this integrated view. Studies show that reading comprehension improves when teaching strategies align with students' cognitive readiness and cultural familiarity (Beatriz et al., 2024; Mala Quinapallo et al., 2025). Similarly, classroom practices that connect cognitive scaffolding with local values—such as *Huyula* and *Dulohupa*—tend to enhance motivation and long-term literacy engagement. This vertical integration allows learning to move fluidly between mind, instruction, and culture, ensuring that each reinforces the other. Thus, the CCLM demonstrates that literacy development thrives when these three dimensions interact harmoniously, forming a cycle of comprehension, reflection, and identity that supports sustainable literacy growth in Gorontalo's educational context.

The Cognitive–Cultural Literacy Model (CCLM) broadens the understanding of reading by placing psycholinguistic processes within social and cultural contexts. Reading is not only a cognitive act but also a reflection of the learner's background knowledge and cultural experiences. When children read texts that are familiar and meaningful to them, their brains process language more efficiently. Studies in cognitive psychology reveal that meaningful content improves working memory performance and supports automatic decoding. This means that culturally embedded texts help learners link linguistic forms to personal experience, making comprehension both faster and deeper (Hofer & Spechtenhauser, 2024; Kwon, 2024).

Therefore, the CCLM advances psycholinguistic theory by moving from an isolated view of cognition to one that recognizes cognition-in-context, where meaning and memory work together to enhance literacy.

Integrating cultural values into literacy instruction not only strengthens comprehension but also nurtures emotional and moral growth. In Gorontalo, cultural wisdoms such as *Dulohupa* (deliberation), *Huyula* (mutual cooperation), and *Mopotilolo* (mutual respect) provide concrete ways to connect reading with lived values. When these concepts are reflected in classroom materials, learners see reading as part of their identity and social life. For instance, *Dulohupa*-based texts encourage collaborative discussion, *Huyula* inspires cooperative projects, and *Mopotilolo* builds respectful dialogue among students. Research on culturally responsive teaching shows that such approaches increase engagement and deepen comprehension (Kimsanova, 2025; Tahir et al., 2025). Thus, in the CCLM framework, culture functions not as decorative content but as a pedagogical instrument that activates emotion, cognition, and character in harmony.

The relevance of the CCLM extends beyond classrooms to curriculum and policy development. Its principles align closely with Indonesia's Kurikulum Merdeka and the Asesmen Kompetensi Minimum (AKM) framework, both of which emphasize critical thinking, comprehension, and cultural identity. The model offers policymakers a structured way to translate these national priorities into classroom practice. Schools can operationalize the CCLM by designing locally contextualized literacy modules that use regional stories and values to teach reading skills. Meanwhile, in-service teacher training can adopt its framework to help teachers design lessons that are cognitively responsive and culturally relevant. By integrating the CCLM into literacy policy, Gorontalo and other regions can promote an education system that values both thinking and belonging—developing readers who are skilled, reflective, and rooted in their culture.

The Cognitive–Cultural Literacy Model (CCLM) makes a theoretical contribution by merging the insights of psycholinguistic processing with those of cultural literacy frameworks. Traditional models often treat cognition and culture as separate domains, but the CCLM shows that the most effective literacy growth occurs where they intersect. This synthesis offers a more holistic understanding of how reading develops through the joint influence of mental processes and cultural meaning. Evidence from literacy research supports that comprehension and motivation are strongest when learning connects personal identity with cognitive engagement (Angchuk, 2022; Asfaw & Bulbula, 2022; González-Ramírez, 2023). Thus, the CCLM bridges the cognitive and sociocultural paradigms, positioning literacy not merely as a skill to acquire but as a shared act of understanding that reflects both the intellect and the identity of the learner.

5. Conclusion

The main finding of this study is that literacy cannot grow effectively without connecting cognitive processes to cultural meaning. Reading development is not only shaped by mental skills such as decoding or memory but also by how learners relate what they read to their world. The Cognitive–Cultural Literacy Model (CCLM) reveals that when culture is integrated into reading instruction, comprehension becomes more meaningful and sustainable. Evidence from psycholinguistic and educational studies shows that familiarity and relevance strengthen working memory and deepen understanding. This finding shifts the view of literacy from a purely mental activity to a social and cultural act of meaning-making. Therefore, the CCLM demonstrates that cognitive efficiency and cultural identity must work together to build literate minds that both think and belong.

Theoretically, this study contributes to the field by bridging two domains that have often been treated separately—psycholinguistics and cultural pedagogy. The integration of these perspectives provides a new lens for understanding reading as a process that involves both mental mechanisms and social experience. Research evidence supports that comprehension, motivation, and memory improve when instruction connects language processing with culturally relevant content. This synthesis extends the work of Scarborough (2001) and Hoover by showing how the cognitive strands of reading can be strengthened through local wisdom in Gorontalo's context. The CCLM therefore offers a conceptual framework that is not only scientifically grounded but also contextually adaptable to multilingual and rural education systems. Hence, this theoretical bridge between mind and culture points toward new directions for literacy-based education in Indonesia and beyond.

Like any conceptual study, this work has its limitations and opens new paths for future research. The model has not yet been tested empirically, and its effectiveness in classroom practice requires validation through longitudinal and experimental studies. Further exploration is also needed to examine how digital media and bilingual exposure influence the cognitive and cultural dimensions of literacy in Gorontalo. Evidence from ongoing literacy programs can help refine the model's application and measurement tools. Expanding this research through collaboration with teachers and local communities will provide more practical insights into the implementation of culturally grounded reading instruction. In this way, the next stage of inquiry will strengthen both the scientific and practical relevance of the CCLM, ensuring that literacy development continues to grow as a shared effort between cognition, education, and culture.

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