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EFFECTIVE READING INSTRUCTION IN LOW-AND MIDDLE-INCOME COUNTRIES: WHAT THE EVIDENCE SHOWS

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The Panel is convened by the Foreign, Commonwealth & Development Office (FCDO), The World Bank, and the United Nations Children's Fund (UNICEF).

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Effective Reading Instruction in Low-and Middle-Income Countries: What the Evidence Shows

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EFFECTIVE READING INSTRUCTION IN LOW-AND MIDDLE-INCOME COUNTRIES: WHAT THE EVIDENCE SHOWS

Executive summary

Learning to read is fundamental to human dignity, freedom, and development. Literacy serves as the foundation for all learning and significantly expands opportunities throughout life. At the national level, countries with higher literacy rates experience stronger economic growth, reduced inequality, and improved public health outcomes. At an individual level, students who read well are more likely to succeed across all subjects in school, while children who do not learn to read face limited educational and career prospects and lower lifetime earnings. Moreover, when children cannot read, investments in other areas of education fail to achieve their potential impact. Ensuring that all children learn to read is therefore both a moral obligation and an economic necessity for every nation.

Unfortunately, many children in low- and middle-income countries (LMICs) are not learning to read. By age ten, a shocking 70% of children in LMICs cannot read and understand a simple, age-appropriate text. In many countries, after several years of instruction, children are so far below expected proficiency, they have very little chance of becoming readers. However, there is substantial evidence that improving reading instruction can sharply increase reading levels.

One of the primary causes of this literacy crisis is the failure to use instructional methods proven by research. Many education systems continue to use outdated approaches that research has shown to be ineffective or lack clear guidance on how to teach reading effectively. Other factors that contribute to poor reading outcomes include insufficient books, inadequate teacher training and ongoing professional development, high absenteeism, limited class time, instruction in unfamiliar languages, and teaching that doesn't match children's learning levels—all compounded by a broader failure to adopt science-based reading practices.

Fortunately, scientific research now provides clear guidance on how children learn to read and how to teach them effectively. Reading is one of the most extensively studied areas of human learning, with over a century of research. While early research focused primarily on English-speaking, high-income countries, the research base has expanded significantly. This report synthesizes the growing research from LMICs, reviewing more than 151 studies on effective reading instruction conducted across Africa, Asia, Latin America and the Caribbean, and the Middle East and covering more than 167 different languages. This expanded evidence confirms that certain fundamental principles of effective reading instruction are universal, though specific aspects of instruction can be adapted to different languages, writing systems, and cultural contexts.

This research shows that reading with comprehension is a complex process that relies on multiple, interconnected skills. These skills can be grouped into two broad domains: **decoding** and **language comprehension**. *Decoding* is the ability to recognize written symbols (e.g., letters) and convert them into the sounds they represent to recognize words. *Language comprehension* involves understanding what those words, sentences, and texts actually mean. Both decoding and language comprehension skills are essential and work together when children read: without decoding skills, children cannot recognize words; without language comprehension, they cannot grasp their meaning (Gough & Tunmer, 1986). Effective reading instruction must develop both skill areas simultaneously. These foundations start in the early years, at home or in formal early childhood education, and become the focus of the primary grades.

To develop these essential reading abilities, children need direct, systematic instruction in six core areas:

1. **Oral language development::** this includes listening and speaking skills, and vocabulary development. Children must understand spoken words before they can comprehend written text. While children naturally develop some oral language skills, targeted classroom instruction significantly accelerates this development.

2. **Phonological awareness**: this is the ability to identify and manipulate the individual sounds in spoken language. Children must understand that spoken words are made up of smaller sound units before they can connect letters to those sounds and blend them into words.

3. **Systematic phonics instruction**: this refers to teaching children the specific relationships between letters and sounds, and how to combine these to form words. Children learn to "sound out" unfamiliar words by identifying each letter's sound and blending them together.

4. **Reading fluency**: this is the ability to read text accurately, quickly, and with appropriate expression. Fluent reading frees up mental energy for understanding meaning rather than struggling to identify individual words.

5. **Reading comprehension**: as part of reading instruction, children also benefit from explicit instruction in specific techniques to understand texts, such as monitoring their own comprehension and building knowledge about the world.

6. **Writing**: a strong evidence base, including emerging research from LMICs, demonstrates that writing instruction—including letter formation, spelling, and composing texts—significantly supports reading development and reinforces the other core skills.

These six skill areas must be taught explicitly, systematically, and comprehensively. *Explicit instruction* means teachers directly demonstrate and explain each skill, providing clear examples before students practice independently. *Systematic instruction* means that skills are taught in a logical order, following a planned scope and sequence. *Comprehensive instruction* means addressing all six skill areas, since weakness in any single area can prevent children from becoming successful readers. This approach contrasts with methods that expect children to discover reading skills on their own or that focus on only some aspects of reading.

A fundamental insight from reading research is that children do not learn to read naturally—reading must be explicitly taught. Unlike spoken language, which children acquire naturally through exposure, reading requires direct instruction. Evidence from neuroscience and cognitive psychology shows that skilled readers process words by rapidly connecting letters to their corresponding sounds, rather than memorizing whole words or guessing meaning from context. This scientific understanding confirms that children need explicit, direct teaching of how letters represent sounds and how to blend these sounds into words.

The core principles of effective reading instruction are universal, but successful programs adapt certain aspects of instruction to language features and individual student needs. First, children within the same classroom often have dramatically different reading abilities. Instruction must be tailored to meet students at their current learning level, ensuring struggling readers receive foundational support before moving to advanced skills. For those struggling, specific adaptations can include individualized or small-group support, multi-sensory approaches and accessible instructional materials. Second, different

languages require somewhat different instructional approaches. For instance, while systematic phonics instruction is beneficial in all alphabetic and alphabet-like languages, there are some differences in the amount of phonics instruction required. Languages with more consistent spelling patterns (like Kiswahili and Spanish) require less instructional time on letter-sound relationships than languages with complex, irregular spelling (like English and French). Similarly, alpha-syllabic writing systems such as Devanagari, Kannada and Tamil use a larger number of symbols and require more extensive instruction in symbol knowledge.

Three additional principles are critical for successful reading instruction:

First, the language of instruction significantly impacts children's reading development. Over one-third of children in LMICs are taught to read in a language they don't speak or understand well. This creates major barriers to literacy acquisition, resulting in slower progress and lower reading proficiency. Research consistently shows children learn to read most effectively when they are first taught in their home language. When using the home language for instruction is not possible, children need much more time and intensive support to develop oral skills in the instructional language before they can successfully learn to read in that language. Policymakers should carefully evaluate their country's language context before deciding on the language of instruction policies.

Second, implementation quality is critical for program success. Even the best-designed reading programs can fail without effective implementation. Success requires aligning with existing government priorities and systems; ensuring sustainable designs that can continue beyond initial funding; supporting teachers in adopting new methods; developing easy-to-use teaching and learning materials; and including the relevant content in skills-based initial teacher education and ongoing professional development. Programs must continuously monitor how well teachers are implementing new methods and provide rapid feedback to make necessary adjustments.

Third, evidence-based reading instruction may be more cost-effective than alternatives. Investing in proven reading methods during children's early school years is likely to reduce the need for expensive remedial programs later, decrease grade repetition, and lower dropout rates. Structured pedagogy programs that incorporate evidence-based reading instruction are among the most cost-effective education interventions available. This makes evidence-based reading instruction particularly attractive for countries seeking maximum impact from limited education budgets.

We urge education policymakers to promote evidence-based instruction so more children become skilled readers. Dramatic improvements in reading outcomes are not only possible but achievable within reasonable timeframes. Such improvements are essential for educational progress, economic development, and social advancement. Based on the comprehensive evidence presented in this report, we recommend policymakers:

1. **Make a national commitment** to ensure all children become skilled readers through effective, evidence-based instruction.

2. **Choose appropriate languages of instruction** and give children the support they need to learn to read in those languages.

3. **Deliver explicit, systematic and comprehensive reading instruction in all six core skills**: oral language, phonological awareness, systematic phonics, reading fluency, reading comprehension, and writing. Ensure that instruction is explicit and systematic—without leaving children to 'figure it out on their own'. Provide students sufficient time to practice reading—including ample opportunities to engage with books, read a variety of texts independently, and build a culture of reading.

4. **Adapt instruction to language characteristics:** the core principles of evidence-aligned reading instruction are universal, but successful programs tailor instruction to address contextual needs.

5. **Focus on effective implementation** by providing teachers with structured support, user-friendly materials, and ongoing professional development.

These evidence-based approaches must be thoughtfully adapted to each country's specific linguistic, cultural, and educational context while maintaining fidelity to the core principles that research has proven effective.

Glossary

Abjad: A writing system that primarily represents consonants (e.g. used by Arabic and Hebrew)

Alphabet: A writing system that uses letters to represent both consonants and vowels (e.g., used by Bantu languages)

Alphabetic WWprinciple: The understanding that letters represent the sounds of spoken language

Alpha syllabary: A writing system where each symbol represents a syllable (e.g., used by Amharic, Hindi, Khmer)

Decoding: Identifying written symbols and converting them into sounds to recognize words

Early Grade Reading Assessment (EGRA): A standardized assessment used to measure early reading skills

Emergent literacy: The developmental process of learning about reading and writing before formal instruction

Explicit instruction: Direct teaching of skills and concepts

L1 (First Language): The native language spoken at home

L2 (Second Language): A language learned after the first language

Language of instruction (LOI): The language used for teaching in schools

Letter-sound correspondence: The relationship between letters and the sounds they represent

Orthography: The writing system of a language, including its script and spelling conventions

Opaque orthography: A writing system where the relationship between letters and sounds is inconsistent (e.g. English)

Phoneme: The smallest meaningful unit of sound in a language. In alphabetic languages, phonemes are often represented by individual letters

Phonemic awareness: The ability to hear, identify, and manipulate individual phonemes

Phonics: The relationship between symbols and sounds and how they combine to form words

Phonological awareness: The ability to identify and manipulate the sounds in spoken language

Reading fluency: The ability to read accurately, automatically, and with appropriate expression

Science of Reading: A multidisciplinary body of empirical research on how children learn to read and how best to teach reading

Structured pedagogy: An instructional model that integrates teaching materials with lesson plans, student materials, in-service teacher training with follow-up support, and aligned initial teacher education

Systematic phonics instruction: A structured approach to teaching letter-sound relationships

Transparent orthography: A writing system where the relationship between letters and sounds is consistent (e.g. Spanish)

Whole language approach: A reading instruction approach that emphasizes meaning-making and contextual clues over explicit phonics instruction

Whole word approach: A reading instruction approach that focuses on memorizing whole words rather than using individual letters to decode them

Word recognition: The ability to identify words

Introduction

Learning to read is the most important goal of primary education and serves as the foundation for individual success throughout life. Reading is the foundation of future academic success and a key predictor of individuals' future life outcomes. Children who learn to read well are more likely to complete their education, find better jobs, and earn higher incomes. The evidence is striking: seven-year-olds who read proficiently earn significantly more as adults at age 42 (Ritchie & Bates, 2013). But the benefits extend beyond economics. Literacy reduces stress and social isolation, increases civic participation and even extends life expectancy (Bavishi et al., 2016; Dinis da Costa et al., 2014; Grotlüsche et al., 2016; Lewis, 2009; Stromquist, 2005).

At a societal level, literacy is a powerful engine of national economic and social development. The connection is clear: nations with better reading scores on international assessments consistently achieve stronger economic growth (Coulombe et al., 2004; Hanushek & Woessmann, 2008). Countries with more literate populations are more productive, experience less poverty and inequality, and enjoy better health and stronger communities (Hanushek & Woessmann, 2012). For instance, when mothers can read, they seek healthcare for their children more effectively. In fact, about half of the global decline in infant mortality between 1970 and 2009 was linked to women's increased education (Gakidou et al., 2010).

On the other hand, the economic costs of illiteracy are substantial and measurable. Research provides concrete estimates. At a global level, the World Literacy Foundation estimates the cost of illiteracy at over USD 1 trillion, while UNESCO estimates that the annual cost of children lacking minimum basic skills exceeds USD 10 trillion (Cree et al., 2023; UNESCO et al., 2024). These findings highlight the urgent economic imperative for evidence-based literacy instruction in developing contexts.

Over the past decades, low- and middle-income countries (LMICs)[1] have taken huge strides towards improving enrollment and literacy rates. In 1970, only 62% of children attended primary school; by 2023, this reached 89% (UNESCO Institute for Statistics [UIS], 2025). More children in school means more literate adults globally (UIS, 2020b). Strong progress has been made in East Asia, Latin America and the Caribbean, and parts of sub-Saharan Africa, where sustained investments in education have led to significant reductions in illiteracy. This progress illustrates the positive impact of international efforts and national policies aimed at promoting education for all.

And yet, large numbers of children are not learning to read in many LMICs. The statistics are alarming: before the pandemic, 57% of 10-year-olds in LMICs could not read and understand a simple story, a condition called 'Learning Poverty.' The pandemic worsened this to an estimated 70% (World Bank et al., 2022). A massive study that analyzed data from early grade reading assessments (EGRAs) from over 500,000 students across 48 LMICs in 96 languages revealed the depth of the crisis: after three years of schooling, over 90% cannot identify letter names, letter sounds or read simple words at expected levels (Crawford et al., 2024). This creates a big gap between what children can understand when someone speaks to them, compared to what they can understand when they try to read. When information was read aloud to students, they showed some listening skills, but when they had to read the same information themselves, they struggled much more because they couldn't decode, or 'sound out' the words. This failure persists despite LMICs spending on average about 4% of their GDP on education (World Bank & UNESCO, 2025). The harsh reality is that getting children into school has not translated into teaching them to read effectively.

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1 Low- and middle-income countries (LMICs) are nations classified by the World Bank based on their gross national income (GNI) per capita. They include low-income countries (with a GNI per capita of $1,135 or less in 2024), lower-middle income countries (with a GNI per capita between $1,136 and $4,495), and upper-middle income countries (with a GNI per capita between $4,496 and $13,935). This classification is commonly used to distinguish countries with lower levels of income and economic resources from high-income countries.

Figure 1: Learning poverty: Share of children at the end-of-primary age below minimum reading proficiency, including out-of-school children (%)
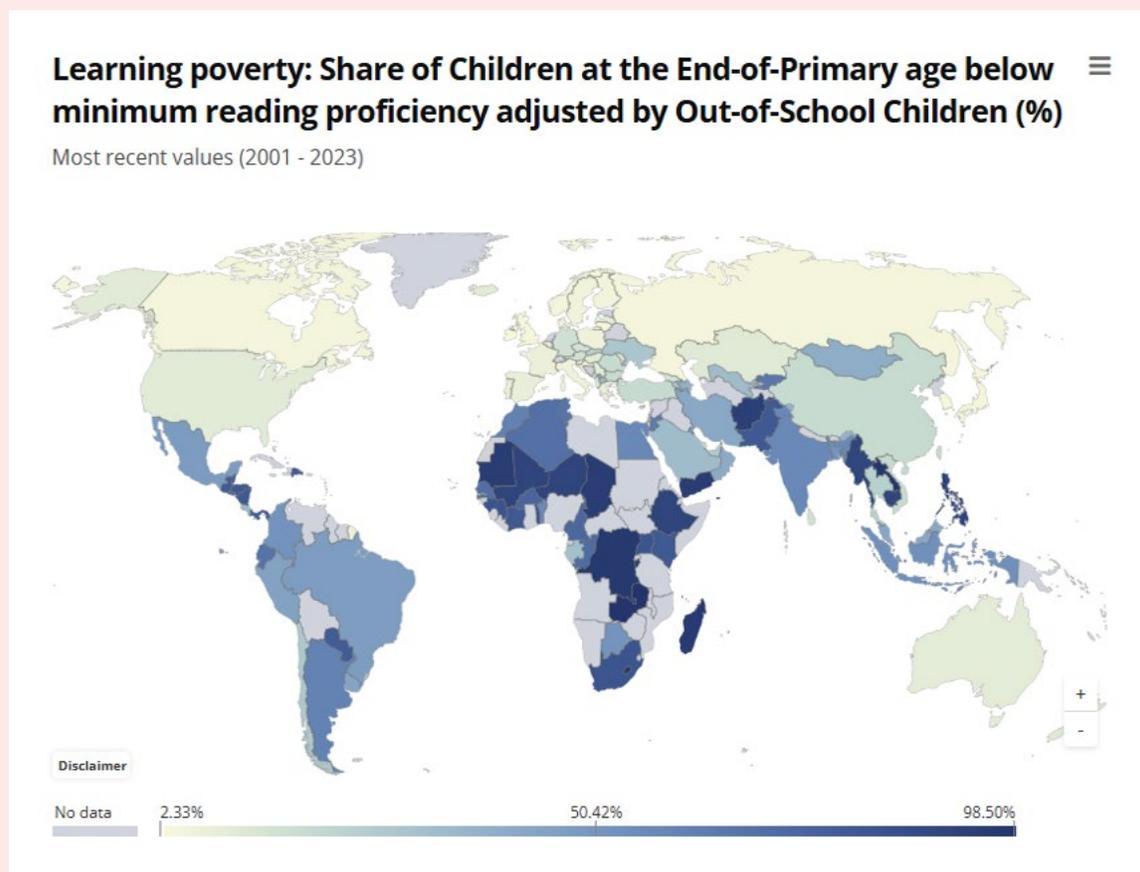
Source: World Bank data360, 2025, available at https://data360.worldbank.org/en/int/indicator/WB_WDI_SE_LPV_PRIM?view=map

A major driver of this learning crisis is the lack of evidence-based instruction in classrooms. The global learning crisis stems from deep-rooted systemic failures, including chronic underinvestment in the teaching profession, poor infrastructure, and weak education system management. But the single most powerful contributor to learning is the **quality of teachers' instruction.** Teachers' daily practices are, in turn, shaped by the pedagogical approaches promoted by their education systems. In LMICs, reading instruction has not always been grounded in the best available evidence—due to weak mechanisms for translating research into practice, institutional inertia, or political influences. Failure to use evidence-based instruction is one of the main causes of the literacy crisis.

Studies have documented the ways in which reading curricula and instruction in many countries are not aligned with evidence. For instance, an analytic review of reading curricula in LMICs found that many programs delay or overcomplicate the teaching of decoding skills—the process of translating words from print to speech—and do not provide sufficient time for students to practice decoding and build fluency (Abadzi, 2016). Observational studies have further documented practices that diverge from evidence-based approaches. A synthesis of 16 ethnographic studies from LMICs found that instruction is often light on explanation and reliant on implicit or incidental learning and noted the use of methods such as rote copying prepared texts and repeating text until memorized (Nag et al., 2016). A study in Sub-Saharan Africa found a heavy reliance on familiar

approaches like repetitive choral reading (repeating after the teacher) even when evidence-aligned curricular materials were introduced, demonstrating the challenge of translating evidence into practice (Hoadley, 2024).

The solution is clear: education systems must adopt teaching methods proven by research. An urgent task of education systems is to implement effective, evidence-based instructional programs that can make most or all students into skilled readers by mid- to late primary school. Effective programs must specify exactly what they aim to teach: what skills to teach (like letter sounds and vocabulary), how to teach them (through explicit instruction and practice), in what order (starting with basics and building complexity), and for how long (adequate time for mastery).

This report presents evidence on what works to teach reading in LMICs. Based on research from 151 studies across more than 167 languages, it identifies the specific teaching methods proven to help children learn to read. It comes 70 years after the landmark UNESCO report, *The Teaching of Reading and Writing* (Gray, 1956), which was the first international comparative study on reading instruction. The present report provides an updated picture of the evidence on what works to teach reading in LMICs.

This report is grounded in the Science of Reading, a vast, multidisciplinary body of research on how children learn to read and how best to teach reading. Drawing from cognitive psychology, neuroscience, linguistics, education and other fields, this research has produced a clear understanding of how children's brains learn to process written language. Studies across diverse contexts reveal a crucial finding: while languages differ, children's brains learn to read in fundamentally similar ways (Dehaene, 2009; Verhoeven & Perfetti, 2017). Therefore, certain basic principles of effective instruction are universal: **explicit instruction** (directly teaching skills), **systematic progression** (following a logical sequence), and **comprehensive coverage** (teaching all necessary skills).

- **Section 1** describes the principles of the **Science of Reading**—the large, multidisciplinary body of research that represents the best scientific understanding of

how children best learn to read. Importantly, it describes the increasing availability of evidence from LMICs.

- **Section 2** presents evidence from LMICs that supports explicit instruction in each of the core reading skills identified in the evidence base: (1) oral language—understanding and using spoken words, (2) phonological awareness—hearing sounds in words, (3) phonics—connecting letters to sounds, (4) fluency—reading smoothly and accurately, (5) comprehension—understanding meaning, and (6) writing—expressing ideas in text. This section makes the paper's key original contribution by gathering recent evidence on the Science of Reading in LMICs.

- **Section 3** addresses the practical challenges policymakers face during design and implementation: choosing the language of instruction (LOI), incorporating new approaches like technology, implementing programs effectively in real classrooms, and understanding cost-effectiveness. This paper draws on the conclusions of other policy documents and research syntheses to highlight key issues that influence the success of reading programs.

The science of reading operates within the broader science of learning and development. While this report focuses specifically on literacy instruction, it is important to recognize that learning to read does not occur in isolation from other domains of development. The science of reading is part of the larger interdisciplinary science of learning, which draws upon diverse fields including developmental psychology, neuroscience, and cognitive science to investigate how humans learn (UNESCO, 2024; UNESCO & UNICEF, 2024). Social-emotional factors—including children's motivation, self-regulation, relationships with teachers and peers, and sense of belonging—significantly influence literacy acquisition and learning outcomes (UNESCO & UNICEF, 2024). Effective reading instruction therefore requires not only evidence-based pedagogical methods but also supportive learning environments that address children's holistic developmental needs (UNESCO, 2024).

Section 1: Global evidence on effective reading instruction

Nepal Credit Kate Maloney_USAID

Global evidence on the Science of Reading

Extensive research provides clear guidance on the most effective methods for teaching children to read. A large body of research, known as the **Science of Reading,** explains how children learn to read, what skills are essential for reading proficiency, and which instructional methods are most effective. This robust evidence base draws from decades of empirical studies, reviews, and meta-analyses across multiple fields including cognitive psychology, linguistics, neuroscience, education, and developmental psychology (Castles et al., 2018). The evidence consistently identifies a specific set of core skills and instructional strategies that effectively teach reading and writing; these are explained later in this section.

Until recently, most research on reading instruction came from high-income countries (HICs). Historically, most of the key evidence about how children learn to read was based on studies conducted in HICs, often involving the English language. Influential government-commissioned reports have included the U.S. *National Reading Panel* and the *National Early Literacy Panel* [NELP] reports, the *Rose Report* in the United Kingdom, the *Teaching Reading* report in Australia, the *Apprendre à lire* in France, and the regional *Eurydice Report on Teaching Reading in Europe*, which demonstrated the consistency of Science of Reading principles across different European linguistic contexts (Eurydice, 2011; Ministère de l'Éducation Nationale, 2006; Eunice Kennedy Shriver National Institute of Child Health

and Human Development [NICHD], 2000; National Early Literacy Panel [NELP], 2008; Rose, 2006; Rowe & National Inquiry into the Teaching of Literacy, 2005). More recent reports include the updated *Apprendre à lire: Du décodage à la compréhension* report from 2022, and two frameworks by the UK's Department of Education: the 2023 *Reading Framework* and the 2025 *Writing Framework*, which promote early, systematic, and structured literacy instruction (Department for Education [DfE], 2023, 2025; Ministère de l'Éducation Nationale, 2022).

In addition, several meta-analyses have empirically and systematically uncovered the most effective methods for teaching reading (Filderman et al., 2021; Foorman et al., 2016; Jeynes, 2007; Maki & Hammerschmidt-Snidarich, 2022). This focus on HICs has led some to question whether the same findings apply to instruction in low- and middle-income contexts or in other languages.

However, there is now a substantial and growing body of evidence from LMICs across multiple languages. Over recent years, extensive evidence from LMICs across all regions has emerged, evaluating the most effective methods for teaching early grade reading. This evidence includes experimental and high-quality quasi-experimental studies that evaluate the effectiveness of specific literacy interventions (such as instruction in oral language, phonological awareness, and systematic phonics). Additional evidence comes from impact evaluations of large-scale, comprehensive education projects, and from high-quality correlational analyses that reveal the relationships between different reading skills. Furthermore, in 2021, the first national government-commissioned report on effective reading instruction was produced in the Global South, with the publication in Brazil of the *Relatório Nacional de Alfabetizacao Baseada em Evidencias* (RENABE) (Ministério da Educação, 2021).

This paper synthesizes evidence on effective reading methods in LMICs. It is a narrative synthesis of global evidence on reading instruction, with a particular focus on LMICs. This paper presents evidence from 151 studies across the Global South, covering over 167 languages, and focuses on reading acquisition in languages that use alphabetic or alpha-syllabary writing systems, which constitute most of the world's written languages. Rather than a meta-analysis, it draws together findings from experimental, quasi-experimental, correlational, and descriptive studies to identify common principles of effective instruction.

The conclusion is clear: the principles of the Science of Reading are largely universal, and children in LMICs learn to read best when instruction is aligned with this evidence. Studies from across the developing world show that children learn to read in fundamentally similar ways across different languages and contexts. Therefore, the core skills involved in learning to read, and the instructional strategies that are most effective, are largely universal.

How do children best learn to read? What science says

As noted above, decades of research across different languages and contexts have provided clear insights into how humans learn to read and how to teach reading most effectively based on that understanding. Below, we describe the key findings and principles of the **Science of Reading** that should guide instructional decisions.

Reading with comprehension is a complex skill that requires mastering multiple interconnected subskills. These subskills can be grouped into two essential domains: decoding and language comprehension. **Decoding** is the ability to recognize written symbols (such as letters) and convert them into the sounds they represent to identify words. **Language comprehension** is the ability to understand meaning, which depends on oral language abilities (including vocabulary knowledge) as well as other capacities such as the use of reading strategies, and background knowledge about the world. knowledge of grammar, syntax and figures of speech. Decoding and language comprehension skills work together and both are essential: without decoding, readers cannot identify words; without language comprehension, they cannot understand their meaning.

This understanding of how reading works, known as the Simple View of Reading[2], has become a widely accepted and influential framework in literacy research and instruction (Gough & Tunmer 1986; Hoover & Gough, 1990). Other frameworks, such as Scarborough's Reading Rope, Kim's Interactive Dynamic Literacy Model, and the Biliteracy House framework, highlight the complex, multifaceted nature of reading (Kim, 2020; Nakamura, 2023; Scarborough, 2001).

To develop decoding and language comprehension skills, children need explicit instruction in six core literacy skills. Multiple systematic reviews have concluded that children benefit from explicit, systematic instruction in the following areas (Foorman et al., 2016; NELP, 2008; NICHD, 2000):

- **Oral language development**: This is the capacity to use and understand language for communication. This includes listening and speaking skills, and vocabulary knowledge. Oral language ability is essential because it enables children to understand the words they read. It can be systematically developed through a range of classroom activities.

- **Phonological awareness**: This is the ability to identify and manipulate the sounds in spoken language. This skill is essential because understanding that words consist of smaller sound units is what helps children understand the fundamental concept that written symbols (like letters) represent spoken sounds. Most young children do not develop phonological awareness naturally and require explicit instruction.

- **Systematic phonics instruction:** This involves directly teaching children the specific relationships between sounds and the letters they represent, and how letters combine to form words. Children learn to read or decode unfamiliar words by identifying each letter's sound and blending these sounds together.

- **Reading fluency:** This is the ability to read text accurately, automatically, and with appropriate expression. After developing decoding skills through systematic phonics instruction, children need extensive guided practice until they can read fluently.

- **Reading comprehension:** Children benefit from explicit instruction in specific techniques for understanding texts. These include reading comprehension strategies (such as monitoring their own understanding while reading) and building background knowledge about the world (which helps children better understand texts).

- **Writing skills:** Evidence from both HICs and LMICs demonstrates the importance of writing instruction, which includes forming letters, spelling words, and composing texts. Writing development supports reading acquisition and creates beneficial reciprocal relationships with the other core skills.

Research demonstrates that these skills must be taught explicitly, systematically, and comprehensively. The following characteristics define effective, science-based reading instruction:

- **Explicit instruction:** Teachers must directly explain, demonstrate and model each skill before providing students with guided practice (Filderman et al. 2021; Foorman et al. 2016; NELP, 2008; Torgerson et al., 2006). This means clearly showing students what to do and how to do it, rather than expecting them to discover skills independently.

- **Systematic instruction:** All skills must be taught in a methodical and logical way, following a planned scope and sequence (NICHD, 2000; Torgerson et al., 2006). While there is no single "perfect" sequence,

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2   While the Simple View provides a useful organizing principle for understanding reading's essential components, it is important to recognize that reading is more complex than the model might suggest. Reading development occurs within a broader context of cognitive, linguistic, social, and emotional development, with these domains interacting in ways that support or constrain literacy acquisition (UNESCO & UNICEF, 2024). The comprehensive approach to literacy instruction presented in this report, which addresses the multiple subskills including oral language, phonological awareness, phonics, fluency, comprehension, and writing, reflects this complexity and situates reading instruction within children's holistic development.

research supports developmentally appropriate progressions that ensure students master foundational skills before advancing.

- **Comprehensive instruction:** All literacy skills must be taught, because reading with comprehension depends on the integration of these interconnected abilities. Weaknesses in any single area can prevent students from becoming successful readers. Therefore, effective programs provide instruction and practice across all essential skills rather than focusing on only some components.

The foundations for these core literacy skills are laid early. Children who experience rich language interactions at home or have quality early childhood education are better prepared, while those without such opportunities are behind in learning to read.

These instructional principles align with the current scientific understanding of how the human brain learns to read. Recent decades have witnessed revolutionary advances in understanding reading through neuroscience research. Neuroimaging studies have revealed the specific brain areas and processes involved in reading and have provided crucial insights for instruction. The research finds that, unlike speaking or listening, reading is not an ability that children develop naturally (Gough, 1996; Lyon, 1998; Moats, 2022). From an evolutionary standpoint, the human brain is not hardwired for reading. *Homo sapiens* appeared some 200,000+ years ago, while writing is a recent invention, developed some 6,000 years ago. Therefore, the brain must repurpose existing regions (originally used for recognizing faces or objects) to process written language and develop new connections—a process called neuronal recycling (Dehaene, 2011). The clear instructional implication is that children need explicit, systematic teaching to help their brains create the new neural pathways necessary for connecting written symbols to sounds and meaning.

Because the brain processes for reading are largely universal, these instructional principles apply in a wide range of contexts, languages, and writing systems. Research reveals that the neural architecture for reading is remarkably similar across all cultures and languages (Dehaene, 2009; Feng et al., 2020;

Rueckl et al., 2015). Whether children learn to read Chinese characters, Arabic script, or Roman letters, the same brain regions become active and develop along similar pathways. In other words, children's brains fundamentally learn to read in the same way regardless of their language, writing system, or cultural context. This neurobiological evidence explains why evidence-based instructional methods work effectively across vastly different educational contexts: they align with universal patterns of how human brains develop reading abilities.

This scientific understanding undermines claims that evidence-based reading instruction only works in certain contexts. Evidence from LMICs, presented throughout this paper, demonstrates that the fundamental challenge—helping children efficiently connect spoken language to written symbols using universal brain architecture—remains the same regardless of a country's economic status, languages, or writing systems. What determines instructional effectiveness is not where research was conducted, but whether teaching methods align with how children's brains learn to process written language.

However, language characteristics and differences will affect certain aspects of instruction. Learning to read involves both universal patterns and language-specific features: all writing systems connect to spoken language, but the details of how this works varies significantly between languages (Verhoeven & Perfetti, 2017). Therefore, differences between languages and writing systems have important implications for instruction.

- First, some writing systems use relatively more symbols than others to represent sounds. For instance, some South Asian scripts, which use hundreds of symbols, take longer to learn than the shorter Arabic and Roman scripts. These writing systems with many symbols need more focused teaching on how letters look and may benefit from more extensive practice with writing or copying to help them remember letter shapes (Verhoeven & Perfetti, 2017).

- Second, the complexity of the relationship between sounds and symbols varies considerably between languages. Some

languages, like Kiswahili and Spanish, are more "transparent," meaning that they have relatively simple relationships between sounds and symbols. In these languages, where letters and sounds match up predictably, children can learn to read most words within just a few weeks of starting to learn (Verhoeven & Perfetti, 2017). More "opaque" languages have a more complex and less consistent relationship between sounds and letters. (For instance, in English, the letter 'a' represents five different sounds). Learners of these languages typically need to spend more time on phonics instruction. In languages like English where spelling is less predictable, teachers need to spend more time directly teaching letter-sound patterns and showing students how to read words that don't follow the usual rules (Verhoeven & Perfetti, 2017).

- Third, teachers also need to decide whether to focus more on sounds or on word parts that carry meaning, depending on the language they're teaching. For example, Chinese requires more attention to meaningful word parts, while alphabetic languages focus more on individual sounds (Perfetti et al., 2013).

- Finally, some languages require more (or fewer) words to express the same idea. For example, the English sentence *It has been cut* is represented by just one word in Kiswahili: *Imekatwa*. Research shows that students need to learn both the sound system and the meaning system of their language's writing, but how much emphasis to put on each depends on the specific language (Verhoeven & Perfetti, 2017).

These differences have implications for reading instruction, including how much time is devoted to specific subskills. Various resources exist to support decision-makers in designing programs for the specific target language.[3]

Moreover, education leaders and teachers must thoughtfully adapt these universal principles to their specific contexts and student needs. While the core principles of effective reading instruction apply across languages and settings, successful implementation also requires adaptation to local circumstances. Evidence-based instruction does not mean rigid, uniform teaching. Instead, teachers should be able to flexibly adjust their approach based on different factors, with support from school leaders and guided by ongoing professional development. For instance, the pacing or focus of instruction may need to be adapted in response to data from classroom assessments, while the choice of reading material may be guided by student interest, local languages, cultural aspects, and other considerations. These research-based adaptations ensure that while basic principles of reading instruction provide the foundation, the specific teaching methods reflect what each classroom actually requires.

The Science of Reading compared to other approaches

Despite strong evidence supporting Science of Reading methods, many education systems continue using ineffective approaches. Even with extensive research on the strategies that are most effective at producing skilled readers, many LMICs persist in using alternative methods that research has shown to be less successful. These approaches reflect different beliefs about how children naturally learn to read.

The debate over how children best learn to read represents one of education's most enduring controversies. With roots extending back centuries to fundamental disagreements about human learning and development, the conflict has centered on two opposing philosophies: explicit, systematic instruction in foundational skills (Science of Reading), versus meaning-based methods like **whole language**, which assume children acquire reading naturally through text exposure

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3   A broad review on how to attend to language-specific characteristics is offered by Asfaha and Nag (2023). For African languages, Pretorious (2019) presents a framework for ensuring literacy instruction is both deeply rooted in evidence and appropriately designed for the characteristics of target indigenous languages. For Indic languages (which include Hindi, Bengali, and Urdu), Nag (2025) uses Kannada as an exemplar to present approaches to literacy instruction in the languages, which can include over 500 distinct symbols.

(Gray, 1956; Castles, et al., 2018; Ripoll et al., 2024). Comparative evidence demonstrates that approaches grounded in the Science of Reading, which include, but are not limited to**,** explicit and systematic phonics instruction—consistently produce superior reading outcome.

For decades, *whole language* **approaches have significantly influenced education policy and practice globally, including in LMICs.** In many countries, literacy instruction has been significantly influenced by **whole language** or **global** approaches, which gained prominence in the latter half of the 20th century. These approaches usually focused on memorization of word shapes and larger text units (on occasion, sentences), analysis of words and syllables, and discovery-based learning of sound-letter relationships, emphasizing children's active construction of meaning (Ferreiro & Teberosky, 1979).

Beginning with the **whole word** methods of basal readers that dominated early 20th century instruction (such as William Gray's *Dick and Jane* series), these approaches emphasized memorizing words by sight or understanding meaning through context, while minimizing phonics instruction (Castles, et al., 2018; Ripoll et al., 2024). Scholars such as Goodman (1967) and Smith (1971) argued that students learn to read by encountering whole words and phrases as visual units in meaningful contexts, rather than decoding words sound-by-sound. Many believed that phonics, the process of teaching children sound-letter relationships, had a limited, subordinate role in learning to read, while others considered it unnecessary or even inimical to natural reading development. For instance, Goodman (1967) argued that readers rely on syntactic, semantic and graphic cues and use context to predict words rather than decoding letter-by-letter. Smith (1971) furthered these ideas by arguing that reading is a cognitive and linguistic activity deeply connected to prior knowledge and comprehension rather than a mechanical process of decoding word sounds.

The whole language approach has profoundly influenced education systems worldwide. In Latin America and the Caribbean, whole language approaches—including 'psychogenetic,' 'global

language,' or 'communicative' methods—became dominant during the 1980s and 1990s. This shift was particularly influenced by Ferreiro and Teberosky (1979), who proposed that children naturally construct understanding of reading through text exploration. This philosophy significantly shaped curricula in countries including Argentina and Bolivia (Ministerio de Educación de Bolivia, 2022; Urdinez, 2022). Indeed, a study found that the "communicative" approach dominated most language curricula in the region (UNESCO/OREALC, 2020).

Many other regions adopted hybrid approaches combining elements of phonics-based (Science of Reading) and whole language methods. These mixed approaches, often referred to as balanced literacy approaches, have been documented in South Africa and Morocco, among others (Barends & Reddy, 2024; Department of Basic Education, Republic of South Africa, 2020; Education Development Center [EDC], 2014; Fleisch, 2023). The widespread adoption of these approaches makes understanding comparative research evidence crucial for policymakers choosing instructional methods.

However, extensive research from the past five decades has decisively resolved this longstanding debate in favor of programs that include systematic phonics instruction. As whole language theories gained popularity, researchers began rigorously testing their core assumptions. The results consistently challenged fundamental whole language claims about reading development (Stanovich, 1986). Beginning in the late 1970s, cognitive science studies found that skilled readers primarily use letter-sound relationships rather than context to identify words, and that good readers recognize words by rapidly processing letter sequences rather than guessing from context (Castles et al., 2018; Stanovich, 2000). In fact, contrary to what Goodman and Smith had proposed, research revealed that it was poor readers who relied more heavily on context cues and guessing strategies, while skilled readers showed a declining use of contextual information as their word recognition abilities improved (Stanovich, 1986). Whole language also wrongly assumed that children learn to read naturally through exposure to print, just as

Harris, a Luminos student in Liberia, reads a local short story called "Help for Mama" where he sees children that look just like him in places he sees every day. **(Photo by Mara Chan/Luminos Fund)**

they acquire spoken language, and that words could be learned as a whole, without the need to teach the relation between the letters and sounds. These findings have been further strengthened by recent research and meta-analyses that have empirically shown that proficient reading requires explicit, systematic instruction in phonemic awareness and phonics, without which many students fail to develop accurate and automatic decoding skills. (Castles et al, 2018; Filderman et al., 2021; Foorman et al., 2016; Jeynes, 2007; Kim et al., 2019; Maki & Hammerschmidt-Snidarich, 2022; Moats, 2022; Willingham, 2017).

Major government reviews have concluded that Science of Reading-aligned approaches outperform whole language approaches. Comprehensive evidence syntheses including the US National Reading Panel report, Australia's Teaching Reading report, and the UK's Rose Report all found that students receiving explicit, systematic phonics instruction significantly outperformed those taught with whole language methods (NICHD, 2000; Rose, 2006; Rowe & National Inquiry into the Teaching of Literacy, 2005). Additional influential government-commissioned reports have expanded this evidence base, including the National Early Literacy Panel [NELP] report in the US, the *Apprendre à lire* in France, and the regional *Eurydice Report on Teaching Reading in Europe*, which demonstrated the consistency of Science of Reading principles across different European linguistic contexts (Eurydice, 2011; Ministère de l'Éducation Nationale, 2006; NELP, 2008).

Evidence from LMICs also shows that programs aligned with the Science of Reading are most effective at producing skilled readers. In a study of eight of the highest-performing large-scale reading programs in LMICs (the *Learning at Scale* study),[4] all programs provided explicit, systematic instruction on the core reading subskills, including phonics-based decoding (Stern et al. 2023). Moreover, numerous comparative studies in LMICs have found that students

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4   The Learning at Scale study analyzed eight programs: Partnership for Education: Learning (Ghana Learning) in Ghana; Read India and Scaling-up Early Reading Intervention (SERI) in India; Tusome Early Grade Reading Activity (Tusome) in Kenya, Northern Education Initiative Plus (NEI+) in Nigeria, Pakistan Reading Project (PRP) in Pakistan; Lecture Pour Tous in Senegal; and Education Quality Improvement Program in Tanzania (EQUIP-T) in Tanzania. Authors first pre-identified 52 programs that met 10 inclusion criteria, and then created a program scoring mechanism to rank programs based on their effectiveness (as measured by their effect sizes on reading fluency), scale, and quality of evaluation design. The eight highest-ranked programs were ultimately selected for inclusion.

learning to read using methods aligned with the Science of Reading outperformed students taught with other methods—similar to findings from high-income contexts. As described in greater detail in Section 2.3 (Systematic Phonics Instruction), studies from Guatemala, Malaysia, Thailand and Zambia show that students receiving systematic phonics-based instruction achieve better reading outcomes than those receiving instruction aligned with whole language methods (Burnham et al. 2013; Del Valle & Mirón, 2017; Jamaludin et al. 2016; Sampa et al. 2018).

This evidence has driven widespread policy changes in many HICs countries and some LMICs, leading to major improvements. For example, beginning in 2010, England mandated systematic phonics as the foundational method for teaching early reading, embedding phonics into the national curriculum, teacher training and assessment systems (Gibb & Peal, 2025). These reforms led to major gains in international reading assessments: England achieved its best-ever progress in international reading literacy study (PIRLS) performance in 2016, ranking eighth place among 50 countries, and later fourth in the 2021 cycle (tested in 2022), even after pandemic-related setbacks. In the United States, 26 states have enacted laws requiring evidence-based reading instruction (Peak, 2025). Since implementing state-wide science-based reading instruction in 2012, the State of Mississippi in the United States has achieved dramatic reading improvements in the National Assessment of Educational Progress (NAEP), particularly for struggling students (Palmiter, 2022). This has also been the case in other US States, such as Alabama, Luisiana and Tennessee, in what has been named the "southern surge" (Hess, 2025). In LMICs, the cases of the municipality of Sobral and the state of Ceará in Brazil, which introduced systematic phonics instruction as the cornerstone of a school-wide reform program, have produced major gains in reading proficiency (see Section 2.3).

It is important to acknowledge, however, that whole language approaches did contribute meaningful innovations to literacy education. These included child-centered instruction; sustained use of authentic literature (beyond basal readers), richer classroom libraries, and read-alouds; and an integrated approach to reading, writing, speaking, and listening, with documented benefits for kindergartners' understanding of print (Stahl & Miller, 1989, as cited in Kim, 2008; Kim, 2008). Stanovich (1993), one of its main critics, recognized that whole language proponents had "legitimate accomplishments" that were undermined by their failure to acknowledge that some children do not discover the *alphabetic principle* (the idea that letters represent the sounds of speech) on their own and require direct, systematic instruction in the different areas of literacy development. Stanovich's primary concern was not that these practices lacked merit, but rather that the wholesale rejection of explicit phonics instruction left many children, particularly those from disadvantaged backgrounds, without the systematic instruction necessary for reading success, ultimately undermining the positive contributions that the whole language movement had made to literacy education.

Evidence-based reading instruction in LMICs: detailed analysis

The remainder of this report provides comprehensive evidence that interventions aligned with Science of Reading are effective in LMIC contexts. **Section 2 examines each of the six core skills** essential for literacy development. For each skill area, we present evidence from LMICs and HICs that explicit instruction produces measurable improvements in reading outcomes. **Section 3 addresses critical implementation considerations** including guidance on language of instruction policies, evidence on cost-effectiveness, proven practices for implementing programs at scale, and a review of emerging topics in literacy instruction, including the role of technology.

Section 2: Components of evidence-based reading instruction

With rapid growth, the Government of Mongolia introduced a number of programs to improve the country's education system, especially rural primary education. Murun County, Mongolia. **Photo: Khasar Sandag / World Bank**

Decades of research have identified the core literacy skills children need to become readers—and how to teach them. These six essential skills are: oral language development (listening and speaking skills, including vocabulary knowledge), phonological awareness (identifying and manipulating sounds in words), systematic phonics (matching letters to sounds), reading fluency (reading smoothly and accurately), reading comprehension (for understanding the meaning of text), and writing (expressing ideas in text).

Major research syntheses have validated these components repeatedly (Foorman et al., 2016; NELP, 2008; NICHD, 2000). While early research came primarily from wealthy countries, we now have extensive evidence from LMICs confirming the importance of these skills. This section presents the LMIC evidence.

This chapter is organized into six subsections, each dedicated to one of the six core skills. For each skill, we follow the same approach: first, we explain what the skill is and why children need it; then, we present evidence from LMICs showing that teaching this skill improves reading; and finally, we note supporting evidence from HICs.

Box 1: When do children learn these skills?

The six skills outlined in this section begin developing at different stages of a child's life. Some children acquire aspects of these skills at home through family interactions, such as being read to or discussing stories (Cuartas et al., 2023; Nores et al., 2024; Rey-Guerra et al., 2022). Others first encounter them in early formal education settings, such as in pre-primary school or kindergarten, where instruction explicitly targets these skills. For children without early exposure at home, such formal experiences are especially critical for building literacy (NELP, 2008; Rao et al., 2019; Shafiq et al., 2018). Until universal early childhood education is available, primary classrooms bear the primary responsibility for teaching all these skills. Regardless of when or where children begin learning them, all six skills are essential for becoming skilled readers.

Component	When are these skills learned?
Oral language development	Oral language development begins at home, grows in the early years of school, and for children learning in another language, requires sustained formal support. Vocabulary continues to expand throughout the academic career.
Phonological awareness	Phonological awareness instruction is usually delivered in the first years of schooling, starting in pre-primary education, through songs, rhymes, and oral word play. Phonological awareness instruction is usually delivered orally but is most effective when taught alongside phonics—to help children start understanding the connection between letters and sounds.
Systematic phonics instruction	Phonics instruction begins and is the primary focus in the lower primary years, though duration varies by language. Children first connect sounds to letters or symbols, then apply this knowledge to read and spell words.
Reading fluency	Fluency begins at home when children hear fluent reading modeled. In the early primary years, once students master the basics of decoding, they slowly develop improved accuracy and speed, and by middle primary, the focus shifts to developing appropriate expression.
Reading comprehension	Two ways to enhance reading comprehension are to build children's knowledge of the world and teach specific comprehension strategies. Building knowledge of the world begins at home and should continue throughout primary school. In the early years, read-alouds provide a forum for demonstrating comprehension. Once children can read accurately, instruction begins to include comprehension strategies which continue throughout primary school.
Writing	In the early years, children learn the purposes of print by imitating writing they see at home. In the earliest part of school, they learn to write some letters and their names. In lower primary they spell the words they are learning to read and write simple descriptions. Across primary, writing is used to practice language rules and to represent ideas.

Section 2.1: Oral language development

Understanding oral language development

Oral language ability is the foundation for all reading comprehension—it encompasses the capacity to understand and use spoken language effectively. Oral language skills encompass various abilities, including vocabulary knowledge, listening comprehension, speaking fluency, and understanding of grammar and idiomatic expressions. Among these, vocabulary knowledge is the most extensively researched component, involving both breadth (the number of words a child knows) and depth (how well they understand each word's meaning and usage). Oral language instruction refers to any systematic teaching designed to develop these spoken language abilities. While young children initially build vocabulary primarily through listening and speaking, reading eventually becomes a major source of new vocabulary as children develop reading skills (Hennessy, 2021).

Oral language skills are essential for reading comprehension because children can only understand written words they already know in spoken form. When children encounter text, they must connect written words to their existing oral vocabulary to comprehend meaning. Without adequate oral language development, reading becomes mere word calling without understanding. Furthermore, oral language development supports the acquisition of other critical reading skills, particularly phonological awareness—the ability to hear and manipulate sounds in words (Ouelette, 2006).

Developing strong oral language skills is essential to overcoming the significant disadvantages faced by children from lower socioeconomic backgrounds. Large gaps in oral language skills emerge early and persist throughout schooling. Research across five Latin American countries found that young children (ages three to six) from low-income families had vocabulary levels equivalent to wealthy children who were one to two years younger (Schady et al., 2015). Research in high-income countries suggest a four-million-word gap

by age four (Gilkerson et al., 2017). These disparities do not naturally close during primary school, indicating that schools must actively address early language disadvantages.

In LMICs, the challenge is compounded by language-of-instruction policies. Nearly 40% of children in LMICs attend schools where the language of instruction differs from their home language (Crawford & Venegas Marin, 2021; UNESCO, 2016) see Section 3.1 on language of instruction. These children face the dual challenge of learning academic content while simultaneously developing proficiency in an unfamiliar language, making systematic oral language instruction even more essential for reading success.

Evidence from LMICs

Oral language skills have a critical impact on reading proficiency. A strong correlation between reading comprehension and oral language skills or vocabulary knowledge has been found in studies conducted across multiple countries—including Chile, China, Iran, Kenya, Mexico, Namibia, Pakistan, and South Africa—using a range of languages. For instance, in a study of Namibian elementary students, Veii and Everatt (2005) found that verbal comprehension ability predicted reading skills in both English and Herero. Similarly, in South Africa, Wilsenach (2015) showed that size of children's receptive vocabulary (words that a person can understand if they hear or read them) in Sesotho, strongly predicted early literacy skills. Evidence from China, Kenya, Pakistan and South Africa shows that both breadth and depth of vocabulary knowledge are highly correlated with reading comprehension (Cai & Liao 2024; Raman & Iqbal 2019; Wawire & Zuilkowski, 2021; Zano & Phatudi 2019). Knowledge of academic vocabulary appears to be particularly important: a study in Mexico found that over a third of variance in reading comprehension levels could be explained by knowledge of a small group of academic words (Romero-Contreras et al., 2021).

High-quality oral language instruction improves reading performance. Rigorous studies across multiple languages—including Arabic, Bangla, English, Turkish, and isiZulu—demonstrate that targeted oral language

instruction produces measurable improvements in both oral language abilities and broader literacy skills. A randomized controlled trial in Bangladesh found that pre-primary students receiving oral language instruction in their native Bangla developed significantly stronger vocabulary knowledge compared to control groups (Opel et al., 2009). In Türkiye, students from low socioeconomic backgrounds who received oral language instruction showed marked improvements in reading comprehension skills (Çetinkaya et al., 2019). Two studies in South Africa also found that oral language instruction improved oral language skills in isiZulu (Ntuli & Pretorius, 2005; Pretorius & Machet, 2008).

Oral language instruction is even more critical and effective for students learning to read in a second language. Students learning in a language different from their home language lack the natural exposure that native speakers receive, making oral language instruction even more central. In Kenya, students learning English showed significant improvements in reading comprehension when teachers introduced key vocabulary prior to reading activities (Mutaliani et al., 2023). In Sri Lanka, a study involving primary students, found that those who received an English oral language intervention outperformed control groups on both vocabulary and reading comprehension, with large effect sizes (Elley, 2000). A similar intervention targeting English oral language skills in South Africa also saw the treatment group outperform the control, with medium to large effects on reading skills (Elley, 2000).

Oral language instruction is a key component of successful large-scale literacy interventions. Multiple impact evaluations have shown that large-scale projects that include oral language instruction can improve reading performance in LMICs. Although these studies do not isolate the causal impact of oral language instruction, they demonstrate it at scale. For example, the EDC (2014) evaluated a project involving 3,000 schools in the Democratic Republic of Congo. The project consisted of a multi-component intervention in primary schools which included a strong emphasis on explicit vocabulary instruction. Results showed that students in the treatment groups outperformed the controls on measures of vocabulary and broader literacy skills. Moreover, statistical analysis demonstrated that

teachers' use of explicit vocabulary instruction activities strongly predicted students' subsequent literacy skills, suggesting that this component contributed substantially to overall program success. In the 2016 Landscape Report on Early Grade Literacy, Kim et al. (2016) examined 20 comprehensive literacy interventions in LMICs and concluded that oral language instruction was effective in boosting oral language ability in some contexts, though there was considerable variation in the impact of different interventions, suggesting that program design and implementation quality can significantly influence outcomes.

Three evidence-based instructional methods can effectively develop oral language skills in LMIC classrooms. Research has identified specific teaching techniques that consistently improve students' oral language development.

First, interactive read-alouds engage students in rich language experiences. Teacher *read-alouds* involve teachers reading stories to the class; in a common variation, called *dialogic reading*, the teacher also engages students in discussions about the text— for instance, asking students questions, prompting predictions, and asking students to retell parts of the story. Multiple LMIC studies demonstrate that dialogic reading improves both oral language skills and reading comprehension (Elley, 2000; Ergül et al., 2016; Ntuli & Pretorius, 2005; Opel et al., 2009; Pretorius & Machet, 2008).

Second, explicit vocabulary instruction directly teaches word meanings. This technique involves teachers deliberately highlighting unfamiliar words and systematically explaining their meanings, forms, and usage. Teachers may also provide explicit instruction on morphology (word parts such as prefixes and suffixes). Research confirms this approach's effectiveness (EDC, 2014; Mutaliani et al., 2023; Smail et al., 2025). Explicit vocabulary instruction can be integrated into various activities—teachers might pre-teach vocabulary before reading or explain words as they arise during text discussions (Elley, 2000). For instance, a study on Arabic-speaking students found that "verbal previewing", the process of discussing text topics and key vocabulary before reading, significantly improved

reading comprehension for second graders when conducted in spoken Arabic, and for sixth graders when conducted in Modern Standard Arabic (Taha et al., 2023). This shows how progressive exposure to formal academic language through reading and writing enhances Arabic speakers' linguistic processing abilities.

Third, pair and group work multiply language practice opportunities. Pair and group work activities, such as "turn and talk" sessions where students discuss teacher-provided topics with partners, significantly increase opportunities for oral language practice (Stewart & Swanson, 2019). When combined with other instructional techniques, these structured conversations have been shown to expand vocabularies and improve reading comprehension (Swanson et al., 2016; Vaughn et al., 2013).

Even before formal schooling begins, parenting interventions that encourage rich verbal interactions can significantly enhance children's oral language development and reduce disparities. Multiple meta-analyses of studies in LMICs have confirmed that parenting programs promoting early stimulation through conversation and book reading lead to meaningful improvements in oral language skills among children under three (Jeong et al., 2021; Jervis et al., 2023; Zhang et al., 2021). Training parents specifically on dialogic or shared reading has proven effective at improving children's oral language skills, even when the parent cannot read. A randomized controlled trial (RCT) in rural South Africa found that infants under two whose mothers received dialogic reading training had greater improvements in vocabulary comprehension and expressive vocabulary than those in the control group (Vally et al., 2015). An RCT in Kenya that provided storybooks and dialogic reading training to mothers of children aged two and six resulted in superior vocabulary gains for children of both literate and illiterate mothers (Knauer et al., 2020). Notably, children of illiterate mothers showed even greater improvements on several measures, showcasing the potential of such interventions to reduce language disparities early on in a child's development. Data from large-scale international assessments also confirm the importance of early home literacy activities. The Progress in International Reading Literacy Study (PIRLS), which assesses Grade four reading comprehension across countries, consistently shows strong associations between early home literacy environments and activities (including book availability at home), and later reading achievement (Mullis et al., 2017). These patterns appear consistently across diverse national contexts, in both LMICs and HICs, reinforcing the universal importance of rich early language experiences.[5]

Evidence from HICs

Extensive research from HICs strongly supports the LMIC findings on the importance of oral language skills. The evidence from LMICs aligns with decades of research from HICs, which has consistently emphasized oral language development as fundamental to literacy success. HIC research demonstrates that oral language abilities are strongly correlated with literacy skills across diverse language families, including Romance, Slavic, Germanic, and Uralic languages (Caravolas et al., 2019; Ehm, et al., 2023; Hulme, et al., 2015; Torppa et al., 2016). A meta-analysis of 63 studies found that oral language skills in children aged five and under strongly predicted their later reading comprehension abilities (Lonigan et al., 2008). Similarly, a study of Spanish-speaking pre-primary students demonstrates that oral language skills significantly influence writing quality (Rodríguez et al., 2025). In addition, a separate meta-analysis confirmed that oral language skills remain important predictors of reading success in older children (Spencer and Wagner, 2018).

Moreover, there is causal evidence that oral language instruction is effective. The National Reading Panel systematic review concluded that vocabulary instruction significantly improved reading comprehension in school-aged children, with subsequent meta-analyses confirming these findings (Elleman et al. 2009; Marulis & Neuman, 2010; NICHD, 2000; Wright & Cervetti, 2017). Research with pre-primary students has demonstrated particularly strong effects. In one meta-analysis, 18 out of 19 studies reported moderate to large positive impacts from oral language instruction (Lonigan et al., 2008).

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5   A total of 66 countries participated in PIRLS 2021. Out of this total, 16 were LMICs.

> **Oral language skills are the foundation of literacy development, and interventions that develop these skills are effective at boosting reading outcomes. Evidence-based classroom activities that support oral language development in LMICs include interactive read-alouds, explicit vocabulary instruction, and structured pair or group discussions.**

Section 2.2: Phonological awareness

Understanding phonological awareness

Phonological awareness is the ability to identify and manipulate the sounds that make up spoken words. This includes understanding that spoken sentences can be broken down into words, that spoken words can be divided into individual syllables, and that these syllables can be further divided into even smaller units of sound (Gillon, 2017). For instance, children must be able to *segment* words orally by breaking them into their component sounds and *blend* these individual sounds together to form words.

Phonological awareness is crucial for reading. The notion that words can be broken down into individual sounds is critical because it underpins the alphabetic principle—the understanding that symbols (such as letters) represent the sound of spoken language—which is essential for phonics-based decoding. For alphabetic languages, a particularly important form of phonological awareness is phonemic awareness. Phonemes are the smallest units of sound in a language; for instance, the English word 'fish' is made up of three phonemes, /f/, /i/, and /sh/. Phonemic awareness is therefore the ability to hear, identify and manipulate individual phonemes (International Literacy Association, 2009). This is essential for reading in alphabetic and alphabet-like writing systems, which typically use symbols to represent individual phonemes.

Phonological awareness requires explicit teaching because it does not develop naturally in most children. While children effortlessly learn to speak and understand language, they do not automatically become conscious of the sound structure underlying speech. Children may develop some basic phonological skills such as recognizing rhymes and syllables as they learn language, but most children do not naturally develop phonemic awareness or other advanced phonological awareness skills without direct instruction (Ziegler & Goswami, 2005).

The good news is that direct instruction in phonological awareness is highly effective at developing these skills. Research consistently demonstrates that systematic instruction successfully develops phonological awareness skills in both typically developing children and those with reading difficulties (Rehfeld et al., 2022; Rice et al., 2022; Suggate, 2016).

Evidence from LMICs

Phonological awareness skills strongly influence children's reading abilities. LMIC studies have confirmed that phonological awareness is strongly correlated with later outcomes in reading, in multiple linguistic contexts—for both alphabetic and non-alphabetic languages. In other words, children with stronger phonological awareness skills are more likely to develop into strong readers. This relationship has been confirmed in languages including Africaans, Arabic, English, Filipino, French, isiZulu, Kannada, Kinyarwanda, Portuguese, Setswana, Siswati, Spanish, and others (Benegusenga et al., 2024; Capellini et al., 2007; Hassanein et al., 2021; Malda et al., 2014; Míguez-Álvarez et al., 2021; NELP, 2008; Pfost, 2015; Prabhu et al., 2024; Schaefer & Kotzé, 2019; Scheepers et al., 2021; Vander Stappen & van Reybroeak 2018; Yang et al., 2021). The consistency of this relationship across such diverse linguistic contexts provides strong evidence that phonological awareness represents a universal foundation for reading development.

Explicit instruction in phonological awareness improves reading skills. Experimental studies from Argentina, Burkina Faso, Peru, Uruguay and other countries have found that students who receive explicit instruction in phonological awareness make greater gains in reading than students who do not receive this instruction (Balbi et al., 2020; Porta et al., 2021; Royer et al., 2004; Velarde Consoli, 2008). For instance, in a pre-primary intervention in a low-income community in Argentina, students assigned to a 12-week intervention focused on phonemic awareness outperformed control students (who were assigned to a reading program with a different focus) on phonological awareness skills in the short-term, and on word reading, spelling and reading comprehension one year after the program (Porta et al., 2021). Similarly, a study in Peru found that eight- to 10-year-old children who received a six-month phonological awareness intervention significantly improved their phonological awareness, decoding, and reading comprehension but those in the control group did not (Velarde Consoli, 2008). In Uruguay, an intervention integrating phonological awareness within a multi-tiered intervention model showed significant improvements for at-risk students when implemented with high fidelity by trained teachers (Balbi et al., 2020).

Phonological awareness instruction is a key component of successful large-scale literacy interventions. In a study of eight of the highest-performing large-scale reading programs in LMICs (featured in the *Learning at Scale* study), all programs included phonological awareness activities as part of a science-based curriculum. Classroom observations from five of these programs (*NEI+* in Nigeria, *Lecture Pour Tous* in Senegal, *Tusome* in Kenya, *SERI* in India, and *EQUIP-T* in Tanzania) found that teachers spent between 1.5% and 29% of instructional time on phonological awareness activities (Stern et al., 2023). Moreover, other impact evaluations that specifically measured phonological awareness outcomes detected significant improvements. For instance, programs in Jordan (*RAMP*), Kenya (*Tusome*), Uganda (*LARA*), and Liberia (*Read Liberia*), all produced statistically significant gains in students' phonemic awareness skills (Chemonics International & School-to-School International, 2019; Dayaratna et al., 2020; Keaveney et al., 2021, Menendez

et al., 2021; NORC, 2020; USAID, 2019). These results demonstrate that phonological awareness instruction can be effectively implemented at scale.

Training teachers on phonological awareness is effective at improving phonological awareness instruction. In many countries, teachers have not been provided with knowledge and skills in phonological awareness during their initial teacher education and professional development. Studies from countries including Ethiopia, Jordan, South Africa and Türkiye—as well as the US—have found that teachers in the study populations have limited knowledge of phonological awareness and its instruction, confuse it with phonics, and do not regularly incorporate this instruction in their classrooms (Alhumsi & Awwad, 2020; Alshaboul, 2018; Cheesman et al., 2009; Haile & Mendisu, 2023; Parpucu & Yıldız, 2024; Schaffler et al., 2019). Fortunately, teacher professional development has been shown to raise students' phonological awareness skills by improving teachers' knowledge and pedagogical skills in this area (Ciesleski & Creaghead 2020). Experimental studies from Türkiye and Chile found that coaching pre-primary teachers on phonological awareness instruction (through classroom observation, corrective feedback and teacher reflection) resulted in significant improvements in children's phonological awareness scores (Muñoz et al., 2018; Parpucu & Yıldız, 2024).

Evidence from HICs

A strong body of evidence from HICs has confirmed that phonological awareness has a powerful influence on reading proficiency. The relationship between phonological awareness and reading success has been documented across numerous high-income countries. Children with strong phonological awareness skills in early years are more likely to develop into successful readers (Lonigan et al. 2008; Melby-Lervåg et al., 2012; Share et al., 1984), a finding that was confirmed in a study across 10 European countries (Tafa, 2008). Conversely, children who have difficulty with phonological awareness skills are more likely to struggle with reading and spelling and are more likely to develop reading disabilities (Share, 2011).

This relationship holds across multiple languages and writing systems. A study found that phonological awareness was the strongest of five predictors of reading performance across five languages (Dutch, Finnish, French, Hungarian, and Portuguese), despite the languages varying in *orthographic depth*, or level of consistency between letters and sounds (Ziegler et al. 2010). Further supporting these cross-linguistic findings, the 2022 *Apprende à lire report* documented, that French children who receive explicit phonological awareness instruction in pre-primary and first grade show significantly better reading outcomes than those who receive implicit instruction (Ministère de l'Éducation Nationale, 2022). Similar findings have been confirmed in Spain (Hernández-Valle & Jiménez, 2001), further demonstrating the universal importance of phonological awareness for reading.

Moreover, various meta-analyses in HICs have documented the strong effectiveness of phonological awareness instruction. Meta-analyses from the U.S. have found that explicitly teaching phonological awareness improves children's current and future reading abilities (Bus & van IJzendoorn, 1999; Ehri et al., 2001; NELP 2008). For example, the U.S. National Reading Panel (NICHD, 2000) found that phonological awareness instruction significantly improves the reading skills of decoding, spelling and reading comprehension, both for normally developing readers as well as at-risk and disabled readers (Ehri et al., 2001). They found that children who participated in reading programs that explicitly taught phonological awareness skills outperformed children who did not receive direct instruction in this area. In addition, a meta-analysis of long-term studies that administered post-tests an average of 11 months after the initial interventions found that the effects of phonological awareness instruction were strongly maintained (Suggate, 2016).

Research from HICs has also identified optimal instructional approaches. Studies show that phonological awareness is most effective when combined with instruction on letter sounds (Hulme et al, 2012; NICHD, 2000). Moreover, research in Spain has demonstrated that explicit phonological awareness instruction is particularly effective when implemented

during early childhood and first grade, with earlier interventions leading to stronger results (Hernández-Valle & Jiménez, 2001).

> **Phonological awareness is a key foundational skill that strongly influences literacy development. Evidence from multiple countries and languages confirms that its inclusion in early grade reading programs is critical for achieving reading success.**

Section 2.3: Systematic phonics instruction

Understanding systematic phonics instruction

Systematic phonics instruction is a structured way of teaching the relationship between letters and sounds, and how the letters combine to form words (Mesmer & Griffith, 2005). This approach follows a logical progression: teachers first introduce a small set of letters and their corresponding sounds, then show students how to blend these letters into simple words.

The instructional sequence builds systematically from simple to complex. For example, English-speaking children might first learn letters s, t, m, p, and a, and then learn how to read words like *sat* and *mat*. Spanish-speaking children might learn vowels, plus key consonants (like m, p, l, s, t) to read words like *mamá* and *mesa*. As students master basic letter-sound relationships, instruction gradually introduces the complete alphabet, letter combinations that represent complex sounds (such as "ch"), and rules for reading more complex words.

Effective phonics instruction emphasizes both explicit teaching and extensive practice. High-quality programs directly teach the rules for combining letters into words and provide abundant opportunities for students to practice these skills until word recognition becomes

quick and automatic. This systematic approach enables students to decode unfamiliar words independently rather than guessing from context or memorizing words as visual units.

Phonics instruction is critical because it develops word recognition, which is central to reading comprehension. To become skilled readers, children must be able to recognize thousands of words automatically. Yet research shows that human memory lacks the capacity to simply memorize these words by sight as complete units (Ehri, 2014; Moats, 2022; Seidenberg, 2017; Share, 2011). Instead, novice readers must pay attention to the letters in the words and use their decoding skills to combine them into words. Gradually, after extensive practice, this process becomes so efficient that skilled readers can recognize words automatically and without conscious effort, which allows them to focus on reading comprehension. Systematic phonics instruction helps children learn to read by explicitly teaching this critical skill.

Evidence from LMICs

Large-scale research across LMICs shows that phonics skills are critical for reading comprehension. A comprehensive analysis of Early Grade Reading Assessment (EGRA) data from 48 LMICs covering 96 different languages found strong positive correlations between students' decoding abilities—including letter recognition, letter-sound identification, nonsense word reading, and oral reading fluency—and their reading comprehension performance (Crawford et al., 2024).

This relationship holds consistently across diverse languages and writing systems. Additional LMIC studies confirm that phonics skills, including the ability to read letters, syllables, and invented words, consistently predict reading comprehension and fluency across an impressive range of languages: Bahasa Indonesia, Chichewa, English, Kikamba, Kiswahili, Lubukusu, Nguni languages, Portuguese, Sesotho-Setswana languages, Spanish, and Xitsonga (Capovilla et al., 2010; de Abreu & Cardoso-Martins, 1998; Guardia, 2003; Kim & Piper, 2019; Makaure & Wilsenach, 2023; Pouezevara et al., 2013; Rodrigues et al., 2017 as cited in Basso et al.,

2019; Spaull et al., 2020; Stern et al., 2018; Wawire & Zuilkowski, 2021; Wills et al., 2022b).

Direct comparisons consistently demonstrate that systematic phonics instruction outperforms alternative approaches. LMIC studies that directly compare phonics instruction to other approaches consistently find that it outperforms the whole language, whole word, and global approaches. This evidence comes from studies in Guatemala, Malaysia, Thailand, and Zambia, using languages such as Cinyanja, English, Icibemba, Kiikaonde, Silozi, Spanish and Thai, as described below.

Results favor phonics instruction across diverse student populations and languages. In Zambia, researchers studied 1,986 students learning in four different languages—Cinyanja, Icibemba, Kiikaonde, and Silozi—to compare the effectiveness of phonics-based instruction versus whole language approaches. Students receiving phonics instruction significantly outperformed control groups on alphabet knowledge in all four languages, and on reading comprehension in Icibemba and Silozi (Sampa et al., 2018). Malaysian research with struggling readers found that students receiving systematic phonics instruction significantly outperformed those taught with whole language methods on both word decoding and overall reading comprehension (Jamaludin et al., 2016). In Thailand, students taught with phonics instruction made fewer spelling errors than those taught with whole word instruction; they also showed more consistent improvement with age, whereas the whole word group showed a plateau after eight years of age (Burnham et al., 2013). In Guatemala, students whose teachers used phonics-based instruction achieved better results on national reading examinations than those taught with global methods (Del Valle & Mirón, 2017).

Other studies have confirmed that systematic phonics instruction improves reading outcomes and outperforms control groups that follow business-as-usual instruction. In Nigeria, researchers randomly assigned 536 primary schools to either systematic phonics instruction or continuation of usual teaching methods. Students receiving phonics instruction

significantly outperformed control groups on word-reading assessments (Counihan et al., 2022). In India, a study involving 20 low-income schools found that students in phonics-aligned programs significantly outperformed controls on both reading and spelling measures (Dixon et al., 2011; Nishanimut et al., 2013). In Gambia, students who received explicit phonics instruction outperformed a control group that followed traditional methods on both reading and writing skills. In Colombia, first-grade students whose teachers received professional development and phonics-based scripted lessons and student materials of the Aprendamos Todos a Leer Program (ATAL), outperformed peers—with benefits for children persisting through third grade, highlighting how early decoding skills support long-term comprehension development (Álvarez Marinelli et al., 2023). In the Dominican Republic, a study compared sixth-grade students who had participated in the USAID-Read project for two and a half years with students in a control group who received traditional schooling. The program combined teacher training and mentoring, a phonics-based curriculum, and grade-leveled materials. The study found that USAID-Read students outperformed control students in both reading and math, and that students with the highest scores were 13% more likely (in reading) and 56% more likely (in math) to have attended USAID-Read schools (Sánchez-Vincitore et al., 2023).

Successful large-scale literacy programs consistently include systematic phonics instruction. Major literacy initiatives across LMICs—spanning languages including English, Hindi, Kiswahili, Setswana, Spanish and Urdu, and three national languages in Senegal—consistently incorporate phonics instruction as a core element. These comprehensive programs combine phonics with other evidence-based techniques, making it difficult to isolate the causal impact of phonics. However, their success demonstrates that phonics instruction can be effectively implemented at scale to benefit thousands of students. In Manizales, Colombia, the ATAL program combined systematic phonics instruction from preschool and first grade with structured teacher training, coaching, and targeted remediation for grades 2-5, resulting in more than 85% of Grade five students achieving or exceeding year-end fluency targets by 2024, compared to 39% in 2018, when the program started (Escobar-Correa, 2024).

The *Learning at Scale* study, which analyzed eight of the most successful, large-scale literacy programs in LMICs, found that all of them used phonics-based instruction, and that this instructional approach was central to program success across diverse languages including English, French, Hindi, Kiswahili, and Urdu (Stern et al., 2023). Moreover, impact evaluations of large projects in Chile, Kenya, Liberia, Peru, and South Africa all found that interventions that included phonics helped improve literacy outcomes (Crouch et al., 2009; Davidson & Hobbs, 2013; Dubeck et al., 2015; Jukes et al., 2017; Keaveney et al., 2021; Pallante & Kim, 2012; Taylor et al., 2019). The message is clear: in multiple contexts, interventions that include systematic phonics instruction have improved literacy at scale.

Another notable example is the case of Morocco, which has pursued a coherent phonics pathway in early reading. Through the Reading for Success (RFS) program, the country introduced a phonics-based national reading curriculum after successful pilots. In 2023, the Pioneer Schools Program (PSP) scaled this approach by combining structured pedagogy with detailed lesson plans that implement the RFS phonics sequence with targeted remediation based on the *Teaching at the Right Level* (TaRL) approach and teacher subject specialization (J-PAL Middle East and North Africa, 2024). Rigorous research comparing PSP schools to similar schools shows very large gains after just one academic year, which are strongest in French, followed by mathematics, then Arabic (J-PAL Middle East and North Africa, 2024). These results place the program in the top 1% of education interventions in LMICs (J-PAL Middle East and North Africa, 2024; World Bank, 2021) Morocco's combination of a phonics-based curriculum with structured pedagogy and remediation is among the most promising in the region.

Finally, the case of Sobral and the state of Ceará in Brazil - one of the most acclaimed literacy reforms in Latin America and the Caribbean - made systematic phonics instruction a core element of its comprehensive reform. The case is described in more detail in Box 2.

Box 2: The case of Sobral and Ceará in Brazil

Systematic phonics instruction has played a pivotal role in one of the most celebrated literacy reforms in Latin America and the Caribbean: the case of Sobral and the state of Ceará in Brazil. Sobral, a municipality in the state of Ceará in northeastern Brazil, implemented one of Latin America's most successful literacy reforms by introducing structured, phonics-based instruction through the *Alfa e Beto* program in the early 2000s. This intervention transformed a failing system— where over half of second graders could not read— into one achieving over 90% literacy rates by 2004 (Barone, 2020; Becskeházy, 2018).

The program combined systematic phonics instruction with comprehensive system support. Core instructional elements included explicit phonics teaching, systematic decoding skill development, and structured fluency-building activities, all supported by aligned materials, detailed weekly lesson plans, and structured lesson plans (da Silva, 2014; Rodrigues da Cruz Boari & Crawford, 2022). Critically, these instructional practices were embedded within a comprehensive system featuring intensive teacher training, ongoing teacher coaching, and rigorous formative assessment (Rodrigues da Cruz Boari & Crawford, 2022).

Systematic monitoring enabled continuous improvement. Moreover, Sobral has measured oral reading fluency for all students since 2001, assessing words read per minute with comprehension—an evidence-based approach rarely implemented elsewhere in Brazil at the time (Barone, 2020). This data-driven approach enabled teachers and administrators to track progress and adjust instruction as needed.

Success led to state-wide expansion and remarkable results. Sobral's achievements prompted the creation of PAIC (*Programa de Alfabetização na Idade Certa*), which scaled these principles across all 184 municipalities in Ceará state. The results were dramatic: Ceará achieved Brazil's highest gains on the Índice de Desenvolvimento da Educação Básica (IDEB) literacy indicator over two decades, with 78.8% of municipalities surpassing the national benchmark by 2023 (Martins, 2024; Ministério da Educação, 2024).

The Ceará model demonstrates essential elements for large-scale success. Researchers attribute these achievements not to any single intervention, but to the systematic implementation of structured, phonics-based instruction with high fidelity, standardized teacher-led formative assessment for all students, monitoring and support to teachers and schools, and sustained political commitment both at the state and municipal level (Assembléia Legislativa do Estado do Ceará, 2006 as cited in Oliveira Costa et al., 2009; Becskeházy, 2018; Rodrigues da Cruz Boari & Crawford, 2022). This case illustrates how evidence-based reading instruction can produce transformational results when implemented as part of a coherent, well-supported system.

Evidence from HICs

The LMIC evidence aligns with extensive research from high-income countries demonstrating that systematic phonics instruction outperforms alternative approaches. Decades of rigorous research in high-income contexts provides overwhelming evidence for phonics instruction's effectiveness, confirming that the benefits observed in LMICs reflect universal principles of reading development.

Landmark meta-analyses provide definitive evidence. The U.S. National Reading Panel's analysis of 38 studies found that systematic phonics instruction significantly outperformed whole language and sight word approaches (NICHD, 2000). Torgerson et al.'s meta-analysis of 12 randomized controlled trials confirmed that systematic phonics instruction was significantly more effective than alternative methods for promoting reading accuracy (2006). Additional reviews conclude that phonics instruction is particularly effective for minority students and provides strong evidence supporting systematic decoding instruction (Foorman et al., 2016; Jeynes, 2007).

Benefits extend across diverse languages and writing systems. The evidence for systematic phonics instruction comes from a range of languages, including Dutch, French and German (de Graaff et al., 2009; Landerl & Wimmer, 2008; Ministère de l'Éducation Nationale, 2022; Ziegler et al., 2024). The 2022 French national report concludes that "explicit and systematic teaching of decoding constitutes the most effective method for learning to read", emphasizing that phonics approaches consistently outperform mixed or analytic methods (Ministère de l'Éducation Nationale, 2022). In fact, a recent study in France shows that **systematic phonics** outperforms mixed methods on **fluency and comprehension,** particularly for children with **low prereading skills** and in **low-income schools.** The advantage **emerges by mid–Grade 1 and persists into the start of Grade 2** (Deauvieau & Gioia, 2024). Research in Spanish is also compelling, with meta-analyses showing medium to high effect sizes for systematic phonics instruction, especially in early grades

(Arco-Tirado et al., 2024; Baker et al., 2022; Jiménez & Guzmán, 2003). These findings confirm that explicit and systematic decoding instruction is effective and can substantially reduce achievement gaps for vulnerable students.

While phonics principles remain consistent across languages, the specific sequence and emphasis of instruction must be adapted to each language. For instance, French instruction benefits from early emphasis on syllabic awareness due to the language's syllable-timed rhythm, while maintaining systematic phoneme-level instruction (Ministère de l'Éducation Nationale, 2022). This aligns with cross-European evidence from the Eurydice report, which found that successful reading programs across EU countries consistently adapt core phonics principles to language-specific features while maintaining systematic, explicit instruction as the foundation (Eurydice, 2011). In fact, most European central curricula recommend such instruction. Pupils learning to read in languages with complex orthographic and syllabic structures appear to take longer to master phonics knowledge than pupils learning to read in orthographically consistent languages (dede Graaff et al., 2009).

> **Systematic phonics instruction is critical to literacy development because it provides children with the foundational knowledge of letter-sound relationships and how to blend letters to decode words. It is the cornerstone of the most successful large-scale reading programs both LMICs and HICs, and should be regarded as a key component of evidence-aligned reading instruction.**

Section 2.4: Reading fluency

Understanding reading fluency

Reading fluency is the ability to read text accurately, quickly, and with appropriate expression—it represents the bridge between decoding individual words and understanding meaning (NICHD, 2000). Fluent readers demonstrate three essential characteristics: **accuracy** (reading words correctly without errors), **automaticity** (recognizing words instantly without conscious effort), and **prosody** or expression (using appropriate intonation and rhythm to reflect the text's meaning).

Reading fluency is essential for comprehension because it frees cognitive resources for understanding meaning. Each component of fluency serves a critical purpose: **accuracy** ensures students correctly identify words and their meanings; **automaticity** allows effortless word recognition so students can concentrate on comprehension rather than decoding, and **prosody** or expression demonstrates that students understand the text well enough to read it meaningfully. Research on cognitive load emphasizes that reducing the burden on working memory through automaticity enables learners to allocate their limited cognitive resources to higher-order comprehension processes rather than basic decoding (Abadzi, 2006; Willingham, 2017). Research confirms that oral reading fluency serves as the crucial bridge between basic decoding skills and reading comprehension (Hsu et al. 2023; Pikulski & Chard, 2005). When students read fluently, they can devote their mental energy to understanding rather than struggling with word identification (LaBerge & Samuels, 1974; Mutema & Pretorius 2024; Seidenberg, 2017; Willingham, 2006).

To become fluent readers, children need targeted practice that builds on their phonics skills. Once children master basic decoding through systematic phonics instruction, they are ready to develop reading fluency through targeted practice. This development

occurs in stages: students first focus on reading words accurately, and then practice reading words and phrases at increasing speeds until word recognition becomes effortless and automatic (Invernizzi, 2014). As automaticity develops, students learn to read with appropriate expression by attending to punctuation, sentence structure, and meaning. Eventually, fluent readers transition naturally from oral to silent reading, maintaining comprehension while reading internally.

Early assessment of reading fluency is critical because students who struggle in first grade face widening achievement gaps that become increasingly difficult to remediate. Students reading a limited number of correct words per minute in the earlier grades show minimal progress in subsequent years, while those above this threshold advance rapidly (Good et al., 1998). This pattern exemplifies Stanovich's (1986) Matthew Effect, where early advantages in decoding compound over time as fluent readers engage in more practice, accelerating vocabulary and comprehension development, while struggling readers fall progressively behind. France's national evaluation for the early years, *EvalAide*, specifically targets fluency as research demonstrates it is one of the strongest predictors of reading comprehension in early grades, making it essential for early screening to identify students requiring intervention before difficulties become entrenched (Dehaene et al., 2019).6 Furthermore, the recent success of England's performance in PIRLS is partially due to the phonics screening check, introduced in 2012 to assess decoding fluency at the end of first grade, demonstrating the effectiveness of early systematic assessment in improving national reading outcomes (Gibb, 2017; Gibb & Peal, 2025; Rastle, 2024; Stainthorp, 2020).

France's national fluency assessment demonstrates systematic fluency monitoring in practice. At the beginning of Grade six (sixième), students complete an individual oral reading test where they read a grade-appropriate text aloud for one minute, scored on words correctly read per minute (Ministère de l'Éducation

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6   France's assessment system also measures fluency in higher grades. For example, at the beginning of Grade six, students complete an individual oral reading test, administered by their teacher, reading a grade-appropriate text aloud for one minute, scored on words correctly read per minute (Ministère de l'Éducation Nationale et de la Jeunesse [MENJ], 2025). This enables immediate identification of students requiring targeted interventions, demonstrating that fluency development extends beyond primary education, as PISA results from 2018 also confirm (OECD, 2023).

Nationale et de la Jeunesse [MENJ], 2025). This assessment enables immediate identification of students with significant reading difficulties, allowing schools to implement targeted interventions from the first days of the academic year. The French Ministry emphasizes that fluency requires continued explicit instruction and monitoring throughout middle school, demonstrating that fluency development extends beyond primary education, as the PISA results demonstrate (OECD, 2023).

While reading fluency is essential across all languages, expected fluency rates vary based on specific language characteristics. For example, word reading accuracy is influenced by transparency—the degree to which sounds correspond predictably to written symbols (Seymour et al., 2003). **Transparent orthographies** like Spanish and voweled Arabic have consistent, predictable relationships between letters and sounds, enabling students to develop fluency more rapidly. **Opaque orthographies** like English, French, and Hebrew have complex, irregular spelling patterns that require more time and practice to achieve fluency. The fluency rate is also influenced by word length and syllable structure—longer, more complex words naturally take more time to read fluently. Despite these variations, the fundamental importance of developing reading fluency remains constant across all languages.

Evidence from LMICs

Reading fluency is highly correlated with reading comprehension in multiple languages. The relationship between fluency and comprehension has been documented consistently across multiple countries, languages, and educational settings. A comprehensive analysis examined assessment scores from primary schools in 48 LMICs and found strong correlations between oral reading fluency and reading comprehension performance (Crawford et al., 2024).

This relationship holds across diverse languages and contexts. Kenyan research analyzing Early Grade Reading Assessment scores from 1,839 children across three sub-Saharan African languages confirmed that reading fluency was strongly linked to text

comprehension in all three languages (Kim and Piper, 2019). Additional sub-Saharan African studies confirm this fluency-comprehension link across languages including Chichewa, English, Kiswahili and Nguni and Sesotho-Setswana languages (Ardington et al., 2021; Draper & Spaull, 2013; Mohohlwane et al., 2022; Piper & Korda, 2011; Pouezevara et al., 2013; Pretorius & Spaull, 2016; Spaull et al., 2020; Stern et al., 2024; Wawire et al., 2023). Importantly, this relationship exists for both native English speakers and second-language learners, though fluency expectations differ between these groups (Wills et al., 2022a). Research in Guatemala found that fluency predicted Spanish reading comprehension, while an Indonesian study demonstrated links between increased oral reading fluency and improved text understanding (Del Valle Catalán, 2016; Stern et al., 2018).

The link between fluency and comprehension persists through secondary education (OECD, 2023). Growth of fluency in the primary grades is well-described and widely used oral reading fluency norms document this (Hasbrouck & Tindal, 2017). But the importance of fluency extends beyond those years: the PISA 2018 fluency module shows that reading speed on simple sentences is a strong, language-specific predictor of 15-year-old's comprehension, with especially pronounced associations in multilingual settings (OECD, 2023). In multiple systems, including the Dominican Republic, Panama, and Peru, large shares of low-achieving15-year-olds were classified as slow readers or traded accuracy for speed, indicating gaps in basic component skills. Similar patterns appear elsewhere such as in Indonesia, Morocco, Malaysia, Philippines and Thailand, and sizable groups of struggling readers in Brazil, Colombia and Kazakhstan also show fluency difficulties.

 The fluency-comprehension relationship is so robust that oral reading fluency serves as a reliable indicator for monitoring student reading progress. Education systems worldwide use oral reading rates as the foundation for empirically validated benchmarks that accurately predict which students will become successful readers (Hasbrouck & Tindal, 2017). While fluency and comprehension are distinct skills—students

must both read fluently and understand meaning—the correlation between them is strong enough that fluency assessments provide valuable information about overall reading development. Oral reading fluency can be measured quickly and objectively, making it an efficient tool for teachers and administrators to track student progress and identify students needing additional support. However, it is crucial that fluency be assessed in a language students understand well, as fluency measures in unfamiliar languages do not provide meaningful information about reading ability. Research from Brazil shows that testing reading fluency in multiple ways is effective. Basso et al. (2019) found that one-minute reading tests can measure three important skills at once: how accurately students read, how automatically they read (without having to sound out each word), and how well they read with expression. Justi & Roazzi (2012) confirmed that timed reading tests using common words reliably show whether students are developing automatic reading skills. Together, these findings support the use of regular fluency checks to track student progress.

Analyses of large-scale literacy programs confirm that fluency instruction significantly improves reading outcomes when integrated into comprehensive interventions. As a composite skill, reading fluency depends on foundational abilities such as decoding, vocabulary, and oral language. It is therefore typically studied within multi-component literacy programs rather than in isolation.

Meta-analysis reveals substantial program impacts. A systematic review analyzed the impacts of 18 early grade literacy interventions in LMICs[7] that included the following components: teacher training around an evidence-based curriculum, instructional guidelines with ongoing coaching and monitoring, supplementary instructional materials, and student assessments. The study found a strong average impact that translates to several months of additional learning (Graham & Kelly, 2018).

Individual country studies also demonstrate impressive results. Chilean research reported strong fluency gains after a seven-month intervention targeting all core reading skills (Pallante & Kim, 2012). The Democratic Republic of Congo saw significant literacy gains from programs including fluency instruction, while Indian interventions incorporating fluency components boosted both fluency and comprehension (Joddar, 2018). Rwanda achieved particularly striking results: a 17-week program doubled fluency growth rates in Kinyarwanda compared to control groups (Rodriguez-Segura et al., 2023). Additional successful implementations in Liberia and Brazil further demonstrate that comprehensive literacy interventions can effectively develop reading fluency at scale (Piper & Korda, 2011; Rodrigues da Cruz Boari & Crawford, 2022). In Argentina, Mendoza Province's *Volver a lo Básico* initiative implemented a Response to Intervention framework combining census-based fluency assessments administered three times annually with targeted interventions including teacher professional development, specialized reading tutors, structured lesson materials, extended instructional time, and small-group remediation sessions for struggling readers. Students receiving targeted interventions achieved 13 to 23 additional correct words per minute by year's end compared to their peers (Alasino et al., 2023).

Research identifies two primary evidence-based approaches for developing reading fluency: assisted reading with teacher support and increased access to engaging reading materials. Once students master basic decoding skills, they need extensive opportunities to practice reading connected text fluently with appropriate support and feedback.

Assisted reading approaches provide structured fluency practice. These methods involve teachers initially modeling fluent reading, then gradually transferring responsibility to students through a sequence of supported practice activities. In Kenya, an RCT implemented a structured progression including echo reading (students repeat after the teacher), choral reading (students read together), partner reading (peer practice), and whisper reading (individual practice), with

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7   Programs included *PAQUED* in the Democratic Republic of Congo, *GILO* in Egypt, *National Literacy and Numeracy Survey* in Jordan, *PRIMR* in Kenya, *USAID Reading Quality Program* in Kyrgyz Republic, *EGRA Plus and LTTP II* in Liberia, *MTPDS* and *EGRA* in Malawi, *RLL* in Mali, *ApaL* in Mozambique, *RARA* in Nigeria, *Reader Booster* in Papua New Guinea, *Bass Pilipinas* in Philippines, *SMRS* in South Africa, *TZ21* in Tanzania, *PEARL* in Tonga and *SHRP* in Uganda.

teachers monitoring progress throughout (Dubeck et al., 2015). This approach proved particularly effective because it built on teachers' existing familiarity with choral reading while systematically developing students' independence. Similarly, in Uganda, a smaller RCT tested a related approach called 'reading-while-listening,' which led to improved reading fluency in the intervention group (Friedland et al., 2017). In Colombia, a series of RCTs found that third-grade students receiving small-group tutorials using "repeated reading"—where students read the same text multiple times with teacher support—made substantial oral reading fluency gains that persisted into fourth grade (Álvarez-Marinelli et al., 2021). Students who received the reading program also improved their math scores, showing that better reading skills can help students learn in other subjects too (Álvarez-Marinelli et al., 2021). Moreover, even students who did not receive tutoring themselves but shared classrooms with tutored students also showed meaningful reading gains compared to students in schools without the program (Berlinski et al., 2023).

Access to engaging reading materials in school is critical for fluency development. Fluency develops through practice—and practice requires access to texts. LMIC research has found that improving access to reading books in schools improves reading fluency and comprehension when combined with other interventions to improve instruction (McEwan, 2015; Stern et al., 2019). Sri Lankan research using a "book flood" approach—saturating classrooms with appealing texts while having teachers model expressive reading—produced reading comprehension gains three times higher than control groups (Elley, 2000). Similar interventions in the Kyrgyz Republic and Uzbekistan expanded access to reading materials while supporting development of expression and accuracy, ultimately enhancing both reading rate and comprehension (Cummiskey et al., 2025; RTI International, 2023). Although it is challenging to isolate the effects of reading materials in multi-component literacy programs (McEwan, 2015), evidence shows that the provision of reading materials amplifies the impact of literacy programs. In Kenya, an experimental study found that adding student books to teacher professional development and coaching boosted reading gains and more than doubled cost-effectiveness (Piper et al., 2018a).

Outside of school, improving access to reading materials at home boosts reading outcomes while addressing disparities in literacy development. Research from LMICs confirms that the home literacy environment significantly influences children's reading outcomes. Two systematic reviews, covering over 30 LMICs each, found a positive association between book availability at home and students' language and literacy skills (Kim et al., 2019; Nag et al., 2024). Similarly, an analysis of UNICEF household survey data across 35 LMICs found that three to six 3–6-year-olds are almost twice as likely to be 'on-track' in literacy and numeracy development if there is at least one book in the home—after controlling for other variables (Manu et al., 2019). Therefore, programs that improve access to books at home can amplify the impacts of literacy programs as part of a package of interventions**.** In Rwanda, a randomized evaluation of the *Literacy Boost* program found that combining teacher training with 'community activities' (including the provision of libraries) yielded a larger impact on reading outcomes than teacher training alone (Friedlander & Goldenberg, 2016).

Evidence from HICs

Evidence from HICs confirms the importance of reading fluency instruction. HIC evidence strongly confirms fluency findings from LMICs and offers detailed guidance on effective instructional approaches. The U.S. National Reading Panel's comprehensive analysis of 38 fluency studies recognized oral reading with feedback and repeated reading as proven methods for improving word recognition, reading fluency, and comprehension (NICHD, 2000). A more recent meta-analysis of 33 studies examining fluency interventions found moderate effects on reading outcomes (Maki & Hammerschmidt-Snidarich, 2022).

International assessment data from HICs confirms that reading fluency continues to matter through secondary education. An analysis of the 2018 PISA results found that fluency remains a key predictor of reading comprehension at age 15 in HICs (OECD, 2023). Although high-performing education systems achieve near-universal fluency, significant challenges remain among low-performing students. In Switzerland, 60%

of students performing below level 2 lacked adequate fluency, while in Austria and Germany, over 70% of low performers were non-fluent. In multilingual countries like Canada, fluency challenges concentrate among students who do not speak the language of instruction at home, highlighting the additional challenges faced by second-language learners (OECD, 2023). These patterns underscore that fluency instruction must continue into secondary school to close persistent comprehension gaps (Hasbrouck & Tindal, 2017).

Research also identifies specific effective instructional techniques for improving fluency. Systematic reviews have highlighted the importance of getting students to read connected text daily and providing students immediate feedback to improve reading accuracy and efficiency (Foorman et al., 2016). For instance, an experimental study found that students receiving oral reading practice with corrective feedback from skilled readers for 14 weeks showed significant improvements in both fluency and comprehension compared to control groups (O'Connor et al., 2007).

> **Reading fluency is critical for reading comprehension, and reading fluency instruction significantly improves reading outcomes when integrated into comprehensive interventions. Providing assisted reading instruction and expanding access to reading materials have been proven to strengthen reading fluency in LMICs.**

Section 2.5: Reading comprehension instruction

Understanding reading comprehension instruction

Reading comprehension is the ultimate goal of all reading instruction and depends on the integration of all previously discussed foundational skills.

Accordingly, it is not a monolithic skill learned once and applied everywhere (Catts, 2022). The Simple View of Reading framework demonstrates that comprehension results from the interaction between decoding abilities (recognizing written words) and language comprehension skills (understanding meaning) (Gough & Tunmer, 1986). Students develop decoding skills through systematic instruction in phonological awareness, phonics, and reading fluency, while oral language instruction builds the vocabulary and language skills essential for understanding text meaning.

Beyond foundational decoding and language skills, successful comprehension requires additional cognitive abilities that can be systematically taught. Reading with comprehension also draws on a range of complex capacities including **reasoning abilities** (making inferences, comparing ideas, evaluating arguments), **background knowledge** (understanding of how the world works), **executive functioning** (self-monitoring, planning, maintaining attention), and **literacy knowledge** (understanding different text types and structures) (Shanahan 2022). Effective readers must use these abilities alongside their decoding and oral language skills to efficiently process text and construct coherent understanding. This complexity explains why some students can decode accurately but still struggle with comprehension, as they may lack other higher-order skills.

Research identifies two complementary approaches for developing reading comprehension: (1) explicit instruction in comprehension strategies and **(2) systematic activating and building of students' background knowledge.** These approaches address different aspects of the comprehension process and work synergistically to improve understanding.

Comprehension strategy instruction teaches students specific mental techniques for understanding text. Comprehension strategy instruction involves teaching students' specific cognitive processes and techniques to improve their understanding and recall of what they read (Shanahan et al., 2010). Key strategies include making predictions about text content, monitoring their own understanding while reading, generating questions about the text, using graphic

organizers to structure information, summarizing main ideas, and drawing inferences from textual clues. For instance, comprehension monitoring—an aspect of metacognition—involves readers checking their mental model of the text, recognizing when they don't understand an aspect of the text, and taking corrective action (Department for Education, 2023). These strategies help students become active, engaged readers who can repair understanding when comprehension breaks down.

Background knowledge instruction recognizes that comprehension depends heavily on what students already know about the world. Background knowledge is the child's store of general knowledge about the world. Studies consistently show that background knowledge is a strong predictor of reading comprehension (Elleman et al., 2022; Hwang & Duke 2020; Shapiro, 2004; Smith et al. 2021). Rich background knowledge helps readers make sense of new information by connecting it to what they already know. This is because, as children read, they draw on their prior knowledge and mental frameworks (schemas) to fill in gaps, make inferences and go beyond the words on the page (Kintsch, 1988; McCarthy et al., 2018). A landmark study illustrates this principle: when students read a passage about baseball, those who knew about baseball understood the text better than stronger readers who lacked baseball knowledge (Recht & Leslie, 1988). Research has explored both **building** new background knowledge (e.g., through topic-focused reading and instruction) and **leveraging** existing knowledge (e.g., by activating students' prior knowledge before reading).

These approaches work best when combined. Research demonstrates that comprehension strategy instruction becomes significantly more effective when combined with background knowledge instruction (Peng et al., 2023). This complementary relationship makes sense: strategies provide tools for processing information, while background knowledge provides the conceptual framework for understanding it.

Evidence from LMICs

Research across LMICs demonstrates that

comprehension strategy instruction improves reading comprehension outcomes. Research from Argentina, China, Namibia, and South Africa provides compelling evidence that teaching students specific strategies for understanding text produces measurable improvements in comprehension performance (Carter et al., 2024; Fonseca et al, 2019; Guo et al., 2023; Liswaniso & Pretorius, 2022).

In Argentina, fourth-grade students who received instruction on comprehension strategies (including comprehension monitoring, self-regulation, inference-making, and text structure) through 16 80-minute sessions made significant gains in comprehension, while control students receiving business-as-usual instruction showed no improvement (Fonseca et al. 2019). In Namibia, a five-month catch-up program that combined instruction on reading accuracy and fluency, vocabulary strategies and reading comprehension strategies, led to large improvements in reading fluency and accuracy, and modest improvements in comprehension (Liswaniso & Pretorius, 2022). In China, a large-scale study trained third grade teachers to deliver over 70-80 minutes of comprehension strategy instruction per semester, teaching skills such as previewing the text to make predictions, integrating prior knowledge, and creating graphs to map the story's plot. Children in the intervention outperformed those who did not receive this instruction on reading comprehension measures, with particularly strong effects for disadvantaged children (Guo et al. 2023). These studies show that comprehension strategy instruction can boost reading comprehension when included in broader literacy programs.

Research in Brazil has shown that it is possible to improve how schools both measure and strengthen reading comprehension through direct instruction at the right level. A team of researchers created a standardized tool to evaluate how well children understand texts, from grade 1 to grade 6. This tool helped identify students' strengths and difficulties, making it easier for teachers to adjust lessons and provide the right kind of support for each grade level. Researchers also adapted the **Cloze test**—a method where words are removed from a passage and students must fill them in—to Brazilian Portuguese. The Cloze

activities were used both to **diagnose comprehension difficulties** and as an **intervention to improve skills**. Students who participated showed significant progress, especially in making connections across ideas and understanding more complex texts. Together, these efforts demonstrate how combining assessment tools with targeted instructional activities can lead to steady improvements in reading comprehension (Corso et al., 2012, 2015, 2017; Santos, 2009).

Studies also find that activating students' existing background knowledge significantly improves reading comprehension in LMICs. Studies in LMICs have focused primarily on leveraging or activating students' prior knowledge through pre-reading activities and discussions, demonstrating that connecting new texts to familiar concepts enhances understanding.

For instance, in Kenya, primary-level English language learners whose teachers were trained on how to activate students' background knowledge showed superior reading comprehension than students who did not receive the intervention (Anyiendah et al., 2021). In Uzbekistan, an intervention shifted teaching from promoting memorization to fostering critical thinking by training teachers to facilitate discussions by drawing on students' prior knowledge. Children in participating schools outperformed controls in identifying main ideas, justifying answers, reflecting on the story, and using more complex reasoning (Sitabkhan et al., 2025). In Nigeria, an intervention trained third grade teachers to activate prior knowledge through pre-reading discussion around pictures related to the title (Anyadiegwu, 2016). Students were asked to share what they knew or thought about the picture and to match target words with their definitions). Those in the experimental group showed significantly better comprehension of the passage than control students.

Evidence from HICs

Research from HICs provides strong confirmation that comprehension strategy instruction and background knowledge approaches are effective methods for improving reading comprehension. High-income country evidence offers robust support for the approaches documented in LMICs and provides additional insights into effective implementation. A

comprehensive meta-analysis found that comprehension strategy instruction and background knowledge instruction are the two most effective types of reading comprehension interventions available (Filderman et al., 2021).

Comprehension strategy instruction is a well-tested approach to improving children's understanding of texts. Multiple additional analyses confirm that comprehension strategy instruction produces substantial comprehension gains compared to conventional teaching methods, with particularly strong benefits for low-performing students (Guo et al., 2023; NICHD, 2000; Spörer & Schünemann, 2014; Wu et al., 2023).

Studies from HICs prove that activating students' existing knowledge proves effective at improving reading outcomes. Research demonstrates that activating students' prior knowledge before reading—through techniques such as open-ended prompts and visual representations—improves readers' comprehension (Hattan et al., 2023; Kaefer, 2020).

Moreover, a growing body of research in high-income countries finds that systematically building children's knowledge improves their reading ability. Beyond activation, studies show that systematically *building* students' background knowledge through literacy instruction enhances domain-specific vocabulary and knowledge, and overall reading comprehension. An emerging body of research supports "content-rich literacy" or "content literacy" approaches that provide structured exposure to interconnected topics in science and social studies to deepen students' knowledge and comprehension abilities (Cabell et al., 2025; Grissmer et al., 2023; Kim et al., 2023; Neuman et al., 2016; Relyea et al., 2024). For instance, a randomized controlled trial (RCT) in the United States found that when first and second graders received literacy instruction integrated with science and social studies content—learning to read while learning about the world—their reading comprehension improved significantly (Kim et al., 2023). Another study found that students exposed to content-rich instruction demonstrated notable improvements in vocabulary knowledge, reading comprehension, and argumentative writing (Kim et al., 2021).

> **Reading comprehension results from the successful integration of decoding and language comprehension skills, but targeted instructional techniques can further enhance reading comprehension. Explicit instruction in comprehension strategies, and activities that build and activate children's background knowledge, have been shown to strengthen reading comprehension.**

Section 2.6: Writing

Writing is the process of expressing thoughts and ideas through written symbols in a structured, meaningful way that others can understand. Writing involves translating spoken language into written form through spelling, grammar, and syntax. Writing and reading share a powerful reciprocal relationship in which each skill supports and reinforces development of the other throughout children's literacy learning (Andersen et al., 2018; Conrad, 2008; Ellis & Cataldo, 1990; Graham et al., 2018). This interconnection means that improvements in writing often lead to improvements in reading, and vice versa.

Writing instruction significantly enhances reading development through multiple pathways. For instance, writing instruction strengthens phonological awareness as children segment words into sounds for spelling, reinforces word recognition through repeated exposure to spelling patterns, and improves reading comprehension by requiring students to organize and express their thoughts clearly (Craig, 2006; Graham et al., 2012; Hall et al., 2015). Reading, on the other hand, provides models of text structure and language that inform writing development (Jiménez, 2016). When students write about texts they have read, they deepen their understanding of both content and text structure. Because reading and writing develop together, experts recommend that schools teach both skills side-by-side starting in the earliest grades (Jiménez, 2016).

Conversely, reading provides essential knowledge and skills that support writing. Through reading, children encounter diverse vocabulary, sophisticated language structures, and various text types that serve as models for their own writing (Goodman & Goodman, 1983). This exposure teaches students how effective authors express ideas, organize information, and use language for different purposes—knowledge they can apply in their own compositions. Exposure to words in books expands vocabulary, while writing requires them to actively recall and use words, creating a reinforcing cycle that strengthens word knowledge (Snow, 2010). Spelling instruction also bridges the two skills: writing words helps solidify the connection between sounds and letters and knowing how to spell a word facilitates quicker word recognition in reading (Treiman et al., 2019). Ultimately, reading and writing together foster stronger communication and literacy skills (Graham & Hebert, 2011).

Reading and writing are closely connected because they both rely on language skills that support overall literacy development. This connection between reading and writing can be explained through a framework called the Simple View of Writing (Berninger et al., 2002). Like the Simple View of Reading this model highlights how central language is to writing success. It shows that students' writing achievement depends on two main skill areas: the mechanics of writing (like spelling and writing fluently) and thinking skills (such as language ability and coming up with ideas). A recent large-scale review of research on students learning to write in a second language confirmed that both skill areas reliably predict how well students write (Graham & Eslami, 2020). Evidence from a writing assessment study conducted with elementary students in the Canary Islands reinforces this point, showing that children's writing performance was closely related to how well they read (Jiménez, 2019). Research on children with learning disabilities reveals the same pattern: when children struggle with reading, they almost always experience difficulties in writing as well (Jiménez, 2017).[8]

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8   Later work has made clear that strong writing also requires skills such as **planning, organizing, and revising**—not just putting words together (Berninger

Evidence from LMICs

While research on writing instruction in LMICs is limited compared to other literacy skills, available evidence indicates that writing and reading are mutually reinforcing, and that writing is an important component of effective literacy programs. The scarcity of writing research in LMIC contexts represents a significant gap, given the demonstrated importance of writing for overall literacy development. However, existing studies provide valuable insights into how writing instruction can be effectively integrated into literacy programs.

LMIC research confirms the interconnection between reading and writing development, with several studies demonstrating how foundational reading skills support text production and vice versa. In Türkiye, a study on 240 primary-aged children found that reading and writing skills were important predictors of each other and have a bidirectional relationship, suggesting that improving one can enhance the other (Yıldırım et al., 2020). In Brazil, this foundational relationship is further supported by de Salles and Correa (2014) and Rodrigues et al., (2017, as cited in Basso et al., 2020), who developed TEPP, a written test to assess word and pseudoword spelling. They found that orthographic knowledge is crucial in aiding decoding and word recognition, while reading reinforces orthographic knowledge, thereby improving spelling skills. Together, these studies emphasize that effective writing instruction must build on the development of foundational reading skills. This requires explicit, structured approaches that recognize the interconnected nature of literacy development and the essential role of orthographic knowledge in supporting both reading and writing competencies.

Writing instruction is a part of high-performing literacy programs. A study of the best-performing, large-scale literacy programs in LMICs found that teachers dedicated substantial time to writing. Across the five programs where classroom observation data are available, teachers spent between 9% and 23% of reading lessons on writing activities (Stern et al., 2023). For instance, India's Scaling-Up Early Reading Intervention allocated nearly a quarter of instructional time to writing, allowing students to apply their phonics knowledge or represent ideas in written form. In a study in Kenya, spelling activities were central to a literacy intervention, leading to improvements in both word recognition and spelling abilities (Dubeck et al., 2015; Jukes et al., 2017). In Northern Nigeria, despite less than five minutes of classroom instruction being dedicated to handwriting and spelling, children's letter writing and spelling still showed moderate improvement (Pflepsen et al., 2016). This suggests that even limited writing instruction can contribute to literacy development, though more substantial time allocation likely produces greater benefits.

Effective writing instruction is aligned with children's developmental stage, progressing from forming letters on paper, to writing for creative expression. Research from LMICs, covering multiple languages, confirms that spelling and writing develop follow predictable stages, and instruction that targets students' current developmental level produces the best results (Bear et al., 2016, as cited in Bulat et al., 2017).

Early writing instruction focuses on foundational skills. Those who are new to writing need explicit instruction in letter formation, which reinforces letter recognition learned in reading (Bulat et al., 2017). As students develop decoding abilities, they should practice translating dictated words into written spelling, connecting their phonics knowledge to writing applications (Shanahan, 2022). Malawi provides a clear example: Grade 2 instruction emphasizes dictation and copying words from phonics lessons (Malawi Institute of Education, 2017a), while in Grades 3 and 4 students use learned vocabulary to write about stories and compose summaries and opinions (Malawi Institute of Education, 2017b). Systematic instruction in spelling can effectively

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& Winn, 2006). To make this more practical for schools, Sedita (2023) developed the **Writing Rope (following Scarborough's *Reading Rope*)**, which illustrates how different strands, such as building ideas, using grammar and text structure, and developing writing fluency, come together to enable students to become skilled writers. Similarly, Kim (2020) emphasizes that writing is a **complex process** that combines language skills, thinking skills, and self-management. These frameworks help educators and policymakers see that writing must be taught explicitly, step by step, with attention to both the mechanics and the thinking processes behind effective communication.

develop these skills. For instance, in Uruguay, The *Método Sophia* and *Jugando con la Ortografía* programs led to significant improvements in spelling through systematic and playful instruction, demonstrating that structured approaches to spelling can be both effective and engaging for students (Palombo & Cuadro, 2023; Palombo et al., 2024). These findings suggest that systematic spelling instruction should be integrated into comprehensive literacy programs.

More advanced writing instruction emphasizes meaning-making and independent writing. For instance, a study on Arabic literacy instruction in the West Bank found that writing instruction focus appropriately varied by grade level, from handwriting and spelling in early grades to idea generation in later grades. However, the study concluded that all grades would benefit from more opportunities for students to write original ideas rather than just copying text (RTI International, 2018). In Uganda, instruction included a wide range of activities, including spelling, grammar, and the complete writing process (planning, drafting, revising, editing, and publishing) to support writing for various genres, including cause-and-effect, description, and poetry, with activities aligned to recently read genres (National Curriculum Development Centre (NCDC), 2018). It is important to ensure that instruction supports students to achieve independent writing.

Independence in writing is crucial but often neglected. An ethnographic study across LMICs revealed a concerning pattern: writing instruction frequently emphasize copying prepared texts from the board rather than providing opportunities for creative, independent writing. This approach produces poor narrative writing skills because students never practice generating and organizing their own ideas (Nag et al., 2016). Effective programs must balance foundational skills with opportunities for independent expression.

Evidence from HICs

While writing research from HICs is also limited compared to other literacy areas, evidence supports the critical role of writing in overall literacy development. Substantial research demonstrates that early spelling instruction plays a crucial role in reading achievement (Arab-Moghaddam & Sénéchal, 2001; Chiappe, et al., 2002; Ehri, 1989, 2000; Ellis & Cataldo, 1990; Morris & Perney, 1984; Treiman et al., 2019). Including writing instruction in literacy programs, which reinforces reading skills in multiple ways: strengthening phonics knowledge as students apply letter-sound relationships in spelling, enhancing word recognition through repeated exposure to spelling patterns, and improving comprehension as children learn to express and organize their thoughts. This integration of writing with reading instruction deepens overall language understanding and supports stronger literacy achievement than reading instruction alone.

Evidence from HICs also sheds light on the most effective methods for teaching writing. For instance, research demonstrates that teaching approaches following "a gradual release of responsibility" from teacher to student are particularly effective (Harris et al., 2006). These include modelled writing ('I do'), shared writing ('we do'), and independent writing ('you do'), alongside guided writing for targeted support (Graham & Harris, 2019). In modelled writing, teachers think aloud while demonstrating the writing process, helping students understand the choices of language and structure involved in problem-solving and critical thinking (Culham, 2016). Goal setting is another well-evidenced strategy, where pupils receive concrete, specific goals to improve writing quality rather than general instructions. As students become more skilled, they can gradually take greater responsibility for setting and monitoring their own goals, helping them become more independent writers (Graham & Harris, 2019). Finally, integrating formative assessment into daily classroom activities pinpoints areas needing additional support and informs teaching to meet individual and whole class needs (Graham et al., 2015).

Comprehensive reviews and practice guides from HICs provide specific recommendations for effective writing instruction that can inform LMIC policy decisions. Major practice guides (Graham et al., 2012) and meta-analyses (Graham & Herbert, 2011) identify five key principles for effective writing instruction:

1. **Provide daily writing opportunities**:
    Students should engage in both structured
    and unstructured writing activities regularly to
    develop fluency, confidence, and automaticity in
    written expression.
2. **Teach foundational writing skills explicitly**:
    Students need direct instruction in spelling,
    handwriting, keyboarding, and sentence
    construction to develop the technical skills
    necessary for fluent idea expression.
3. **Treat writing as a complete process:** Students
    should learn writing as a multi-stage process
    including planning, drafting, revising, editing,
    and publishing, helping them understand that
    effective writing develops through multiple
    iterations rather than single attempts.
4. **Teach purpose-specific writing strategies:**
    Students should learn distinct strategies
    for different writing purposes—persuasive,
    narrative, and expository writing—to strengthen
    their ability to organize ideas and communicate
    clearly across contexts.
5. **Recognize writing's developmental nature:**
    Writing instruction should encompass diverse
    components including handwriting, spelling,
    syntax, and opportunities for self-expression
    and analytical thinking. The instructional focus
    should shift developmentally, emphasizing
    handwriting and spelling in early grades
    while gradually increasing attention to idea
    generation and organization.

These principles provide a framework that LMIC
education systems to adapt to their specific contexts and
resource constraints.

> **Reading and writing skills are mutually
> reinforcing, and writing instruction is a
> key component of successful literacy
> programs in LMICs. Effective writing
> instruction is explicit, provides daily
> writing practice, and is developmentally
> appropriate, culminating in students'
> ability to express original ideas.**

Section 3: Considerations for design and implementation

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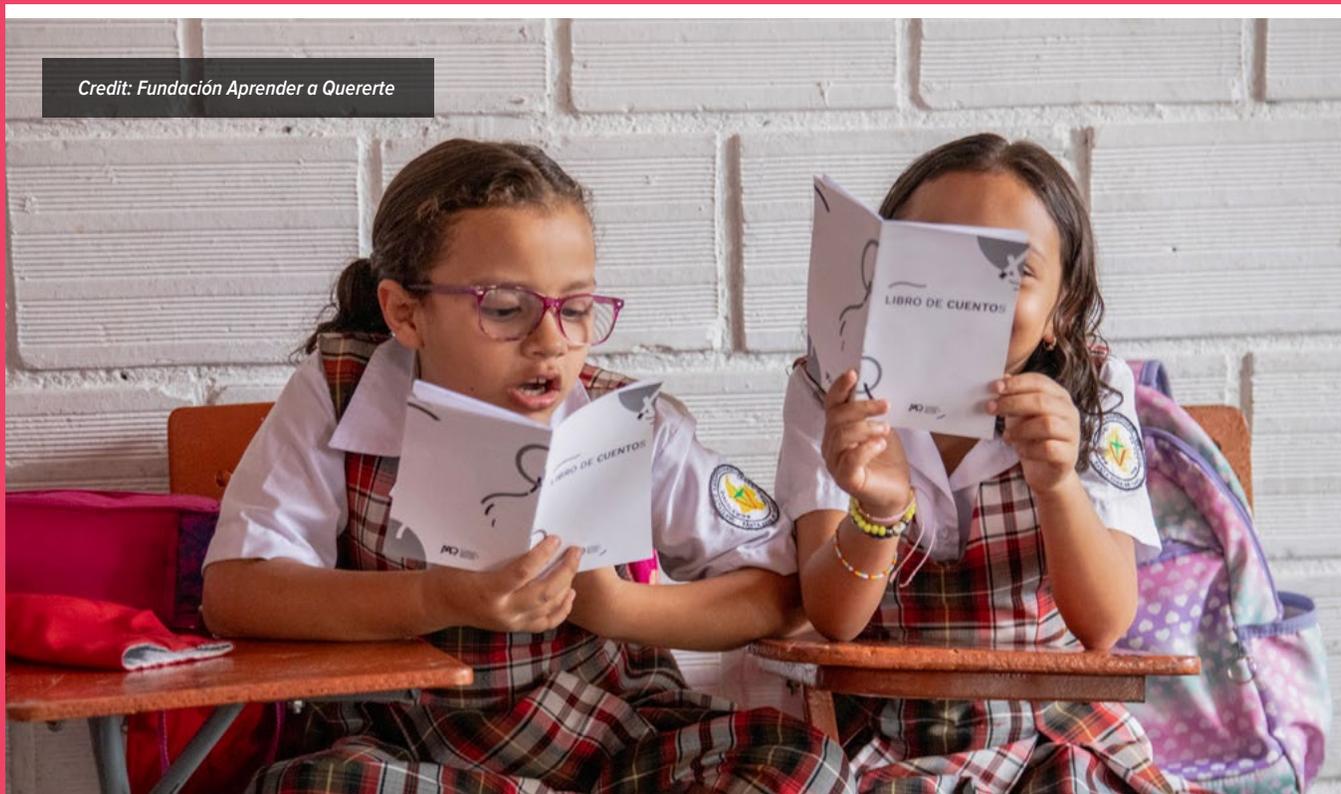
Section 3.1: Language of instruction

Introduction

The choice of language used for teaching has a decisive impact on whether children in LMICs can learn to read successfully. While political, cultural, and economic factors influence language policy decisions (Crawford & Venegas-Marin, 2021; Jhingran, 2019; UNESCO, 2016; UNESCO; 2024), the educational consequences are clear: when children are taught in a language they do not speak at home, their reading development suffers. Language of instruction is a choice that has profound implications on whether and to what extent children learn to read. In many countries, low reading outcomes are the result of inadequate language of instruction (LOI) policies that require teachers to deliver instruction in a language that students—and oftentimes teachers themselves—do not speak or understand well. A vast body of evidence confirms that children learn to read better and more quickly if they are taught in their first language (the language they speak and understand best). Children who do not learn to read in their first language are likely to make slower progress and struggle with reading unless provided with strong additional support. But regardless of the target language, the core principles of the Science of Reading still apply and remain effective. Education systems need to understand their language landscapes and develop policies that respond to them effectively (UNESCO, 2016; UNESCO, 2025).

The Challenge

The scale of the language mismatch problem is staggering: between 37% and 40% of children in LMICs are taught to read in a language different from the one they speak at home (Crawford & Venegas-Marin, 2021; Del Valle Catalán, 2016). In sub-Saharan Africa, this figure rises to 87% (Crawford & Venegas-Marin, 2021). This language barrier undermines the entire reading process. When children don't understand the language of instruction, they cannot develop the two essential components of reading: oral language skills (understanding what words mean) and decoding skills (connecting letters to sounds). This may explain why so many students score zero on reading assessments—they literally cannot read a single word in the language being tested (Crawford et al, 2024; UNESCO, 2016).

The vocabulary gap between home-language and second-language learners is enormous and persistent. **Children who do not speak the language of instruction at home typically join school with weaker oral language skills and struggle to catch up with native speaker peers.** Children have sophisticated language abilities in their first language when they start primary school. Normally developing children begin talking by age two and learn on average around 1,000 words per year (Biemiller & Slonim, 2001; Goulden, et al., 1990). When they enter primary school at age five or six, they will typically know between 3,000 to 5,000 words (Graves, 2006; Stahl & Nagy, 2006). Their vocabulary knowledge exists alongside a host of other sophisticated and fast-developing language abilities, for example, the ability to produce connected multi-phrase utterances (Berko Gleason & Bernstein Ratner, 2022). Literacy instruction seeks to expand and improve these abilities over many years. By the time they finish high school, typical children will have increased their vocabulary by a factor of four or five and know 15,000 to 20,000 words. Children who learn in a second language (L2) do not come close to matching this growth, even under optimal learning conditions such as high-quality immersion programs (Cummins, 2014). Danelund (2013) found that after nine years of instruction in Denmark, only 48% of Hungarian children had mastery of the 2,000 most

frequent words. Webb & Chang (2012, as cited in Webb & Nation, 2017) estimated that elementary students in Taiwan learned between 18 and 430 word families[9] per year. After nine years of instruction, only 16% of learners had mastery of the 2,000 most frequently occurring word families.

Limited vocabulary also blocks children from developing other essential reading skills. In addition to having deficiencies in oral language skills (such as vocabulary knowledge), children learning to read in a second language (L2) also have difficulty acquiring other reading subskills related to decoding. For instance, even in monolingual contexts, many children have trouble with phonological awareness skills such as segmenting sounds in words, even when they know several thousand words in their L1. Children learning to read in an L2, who may know only a few words, are even less able to discern word sounds, making decoding more difficult. As explained by Crawford and Venegas-Marin (2021, p.39), "decoding, which should allow students to turn written words into 'spoken language in their heads,' instead devolves to rote memorization of arbitrary and meaningless relationships." Dehaene (2009) and others emphasize that students cannot decode words with comprehension if they do not already understand the meaning of those words in spoken language.

How to respond: evidence from LMICs

The evidence is overwhelming: children learn to read best in their home language. A systematic review of 45 studies found that home-language instruction consistently produces better reading outcomes than second-language instruction across a wide range of measures (Nakamura et al., 2023). The size of this advantage is substantial. In the Philippines, students taught in their home language outperformed those taught in a second language by more than a full standard deviation—equivalent to roughly three years of learning (Walter & Dekker, 2011). Similarly, a comparison of two RCTs in South Africa targeting L1 and L2, respectively, found large impacts on reading when L1 was targeted and small effects when L2 was targeted, confirming the

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9   **A word family is** a group of words that share a common root or stem, meaning they have the same basic meaning or pattern of letters and sounds.

efficiency of targeting L1 (Mohohlwane et al., 2023). An RCT from Kenya found that students taught in the Lubukusu and Kikamba languages, their L1, successfully learnt to decode and outperformed the control group (Piper et al., 2016b). Data from a natural experiment in Ethiopia was analyzed by Ramachandran (2017), who concluded that students taught in their L1 increase scores on some literacy measures by 40%, and Argaw (2016), found that the boost in literacy skills from L1 instruction appeared to translate to better labor market outcomes. These studies span different continents, languages, and education systems, yet all reach the same conclusion: home-language instruction works.

Teaching children to read first in their home language usually improves their ability to read in a second language later. When children develop strong reading skills in their home language, they can transfer these skills to a new language more easily (Crawford & Venegas-Marin, 2021). Studies from Cameroon and the Philippines found that home-language instruction improved outcomes in both the home language and the second language (Laitin et al., 2019; Walter and Dekker, 2011). A well-designed program in South Africa improved both languages when instruction began in the home language but only improved the second language (at the expense of the home language) when instruction began in the second language (Mohohlwane et al., 2023). However, the transfer effect is not universal. Studies in Kenya and Mexico found no advantage for second-language learning from initial home-language instruction, suggesting that program quality and implementation matter (Piper et al., 2016b; Santibañez, 2016).

Given this evidence, the most effective approach is to teach children to read first in their home language wherever feasible. Language of instruction choices are complex and must be adapted to local conditions. More detailed guidance on the range of policy options available is provided by the World Bank and the Science of Teaching website (Crawford & Venegas Marin, 2021; Ralaingita et al., 2021). However, one commonly recommended approach is to teach early reading in a language children understand for at least the first six

years of primary school. Where an additional language of instruction is needed, it can be introduced gradually alongside the home language, with both languages used in parallel for many years. This approach works in many contexts, though other models can also be effective; the key is adopting an approach suited to the context.

When instruction in the home language isn't possible, the science-based reading principles in this report still hold—but children will need additional support. Children should learn to read in their home language whenever possible. However, in many settings this isn't feasible due to practical constraints, such as limited teaching materials and a shortage of qualified teachers for languages with very small speaker populations. Policymakers may also face trade-offs shaped by political and economic priorities around national languages. As a result, some children may need to learn to read first in a language they don't speak at home. These learners require additional, targeted support.[10]

Other specific actions can help second language learners become literate. Several approaches to supporting second language learners are recommended, based on Jeon & Yamashita (2024) and related research:

- **Intensive oral language development**: Before focusing on reading, spend substantial time building speaking and listening skills through interactive activities, games, and conversations about familiar topics.

- **Low-stress vocabulary building**: Create a supportive environment where students learn new words through understanding and use, supported by some explicit vocabulary teaching.

- **Targeted phonics instruction**: Explicitly teach the sound differences between the home language and instruction language. For example, if the home language lacks certain sounds present in the instruction language, spend extra time on these challenging sounds.

- **Extra reading practice**: Provide multiple opportunities to read the same texts

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10   UNESCO has developed comprehensive guidance on multilingual education that complements the evidence presented here. Policymakers designing language of instruction policies can draw on several resources that provide detailed frameworks for multilingual education planning and implementation (UNESCO, 2025). These resources offer evidence-based recommendations for developing and implementing mother tongue-based multilingual education programs, practical guidance on curriculum development, teacher training, and assessment in multilingual contexts (UNESCO, 2016; UNESCO, 2020).

(re-reading) and examine texts closely (close reading) to build both fluency and comprehension.

- **Language-rich environments**: Extend learning beyond formal lessons through labeled classroom objects, audio resources, reading corners, and community engagement in the language of instruction.
- **Strategic use of the home language:** Even if it is not the official medium, teachers can use the home language to boost learning. Studies have found that students learned more second language words when teachers explained new vocabulary in the home language, and students who discussed texts in their home language had better second-language comprehension (Koyuncu, 2024; Pacheco et al., 2017).

- **Allowing extra time for literacy instruction:** Second language learners typically learn to read more slowly than children who are taught in their home language, partly because they need extra time to improve their oral language skills. Education plans, curricula, and assessments must account for these longer timelines to avoid setting unrealistic expectations that lead to failure.

Policy recommendations: the evidence supports three clear guidelines for policy design:

1. **Understand the linguistic context:** Policymakers should systematically assess the languages used in their settings and select an instructional language that aligns with the evidence and local realities.

2. **Teach children to read first in their home language whenever possible:** There is clear evidence that this leads to the best results.

3. **Provide children who learn to read first in a second language with extra time and support:** If children cannot learn to read first in their home language, they will need extra time and support to become proficient.

Section 3.2: The role of technology

Digital technology is creating new opportunities to improve reading instruction in LMICs. Interventions that make use of technology, including interactive tablets and digital reading platforms, are increasingly being introduced in LMICs. Early findings suggest their potential for providing personalized learning in classrooms where students are at different learning levels, expanding access to print where books are scarce, and maintaining student engagement in learning. While still relatively new in many LMIC settings, these technologies show promise and deserve careful consideration by education planners.

Digital personalized learning solutions have been shown to meaningfully impact literacy outcomes in LMICs. Digital personalized learning (DPL), also referred to as Personalized Adaptive Learning (PAL), leverages artificial intelligence and machine learning to provide students with adaptive instruction tailored to their competency levels. Interventions in LMICs have leveraged these tools to complement classroom instruction and help students learn and practice reading skills at their level. A meta-analysis covering 27 studies from both HICs and LMICs found that DPL solutions produce a significant positive effect on literacy outcomes in primary and secondary education (Alrawashdeh et al., 2024). This aligns with another meta-analysis, focused on LMIC studies, which found that DPL solutions moderately improve both literacy and numeracy outcomes in children aged six to 15 (Major et al., 2021).

Across regions, multiple interventions have leveraged DPL solutions to improve early grade reading. In Kenya, an intervention provided pre-primary students with a personalized learning platform, EIDU, with content taken from the existing Tayari literacy curriculum (Ngware et al., 2018). An RCT reported a significant effect size on emergent literacy outcomes equivalent to an additional 0.8 years of learning (Daltry et al., 2023). Similarly, in India, GraphoLearn—a game-based reading program focused on strengthening letter-sound knowledge, decoding and word reading—led to measurable gains in struggling readers, and improved reading achievement for 1st and 2nd grade students

(Patel et al., 2018, 2022). In Brazil, a school-level randomized trial in São Paulo used the adaptive Kalulu tablet program, paired with simple paper activities, to introduce phonics into business-as-usual whole-language classrooms after only a brief implementation orientation and light ongoing support. Delivered within the regular literacy class (i.e., no extra minutes), after 15 weeks, students in the intervention classrooms read five more words per minute and had higher phonological skills than those in the control (Olalla et al., 2025). In Sub-Saharan Africa, onecourse (developed by onebillion) offers sequenced, adaptive lessons in literacy and numeracy aligned with national curricula. It won the Global Learning XPrize competition in 2019 for outperforming other finalists in an RCT in Tanzania and has produced positive learning gains in nine other RCTs since then (Pitchford & Levesque, 2024). In Egypt, Jordan, and Saudi Arabia, an RCT evaluated DPL solutions in early grade students, finding that these tools improved reading outcomes (Alrawashdeh, 2023).

Digital platforms such as EIDU, GraphoLearn/ GraphoGame, onecourse, and Mindspark demonstrate that effective ed-tech solutions in LMICs integrate principles from the Science of Reading. A small selection of digital solutions that have been rigorously assessed in the past few years demonstrates how these platforms are aligned with evidence-based principles. GraphoLearn systematically builds phonemic awareness and decoding skills by teaching sound–letter correspondences and blending skills (Martínez et al., 2022; Patel et al., 2018, 2022). Onecourse explicitly teaches phonics and includes decodable texts. The program also follows best practices on language of instruction, as it was developed initially in Chichewa, a Bantu language primarily spoken in Malawi (onebillion, n.d.; Pitchford & Levesque, 2024). Similarly, Mindspark, which produced substantial literacy gains in India in rigorous impact evaluations, aligns with the Science of Reading by providing direct practice in phonics, leveraging diagnostic assessments to place students at an appropriate instructional level and deliver adaptive feedback, and providing continuous practice in decoding, vocabulary, and comprehension (Muralidharan & Singh, 2022; Muralidharan et al., 2019). EIDU complements these approaches with adaptive instruction embedded in pre-primary curricula, yielding

large literacy gains in Kenya (Daltry et al., 2023). These design choices show alignment with the skills discussed in Section 2.

I**mportantly, these solutions align with reading science and have been piloted and, in some cases, taken up within public systems and schools.** onecourse has been implemented through Malawi's BEFIT program, which schedules 90 minutes of tablet-based literacy and numeracy weekly (Malawi Ministry of Education & Imagine Worldwide, 2024). EIDU reports uptake across multiple Kenyan counties, serving large cohorts in select jurisdictions**,** while Mindspark has maintained user bases in India and a few other settings, supported by RCT evidence of impact (Muralidharan et al., 2019). GraphoGame has been studied and adapted in multiple countries (e.g., Chile, Brazil, India), with consistent improvements in reading outcomes (Patel et al., 2018, 2022; Martínez et al., 2023; Marques de Souza et al., 2022). Much of this activity has involved donor or philanthropic co-financing and NGO implementation support, and overall scale remains modest relative to national enrollments. Taken together, these experiences are consistent with feasibility and some demand, pending further evidence on sustainability.

These technologies can enhance classroom instruction by addressing key challenges in LMICs education systems. First, their adaptive software provides access to differentiated instruction adjusted to the child's learning level, which can be especially beneficial in classrooms where reading levels vary widely. Second, they expand access to texts in areas where print materials are scarce. (However, children still need access to print material—as it better supports deep processing and retention than screen-based text). Finally, it can enhance students' engagement and interest in reading through interactive exercises and game-like elements.

Technology should supplement—not replace—quality teaching. Importantly, these tools are not intended to replace teachers. Rather, they can provide targeted support when used in moderation, such as for 20 minutes a day, to reinforce foundational skills. Teachers remain central to instruction: engaging students, delivering whole class lessons, and refining learning through their own observations and interactions. While

technology offers valuable opportunities, they can also come with challenges: high costs, limited availability in some settings, and a lack of support for many local languages. Still, in the right contexts, where DPL technologies are viable and aligned with the language of instruction, technology can be a useful supplement within the broader instructional routine.

Beyond its role as a learning tool for students, technology is supporting literacy in various additional ways. Across LMICs, technology is being used to support literacy instruction in several ways. Some examples include:

- **Supporting teacher-directed instruction and assessment.** For instance, in Kenya, teachers who used tablets—containing lesson plans, supplemental pedagogical aides, and a continuous assessment tool to check students' understanding—produced superior reading fluency outcomes to the teachers in a control group (Piper et al., 2016a).
- **Enhancing teacher professional development (TPD).** An example of technology-supported TPD at scale is DIKSHA, India's national digital platform for education, which provides online and blended training courses and certifications aligned with the official literacy curriculum and the country's national TPD program.
- **Facilitating book production in local languages**. For instance, Bloom (https://bloom.sil.org/) is an open-access software tool developed by SIL International that enables communities to create, translate and publish books in local languages, including decodable and grade-leveled reading books.

Section 3.3: Instruction for children with reading difficulties

While the six core reading skills described in Section 2 benefit all students, education systems must also address the reality that some children face persistent reading difficulties despite quality instruction. Understanding how reading difficulties manifest across different languages and contexts, and knowing how to adapt evidence-based methods for struggling learners, is essential for achieving universal literacy goals. Research demonstrates that the same fundamental principles of effective reading instruction apply to students with reading difficulties, though these learners typically require more intensive, systematic support and additional instructional time to achieve proficiency.

Understanding reading difficulties and dyslexia

Reading difficulties represent a significant challenge across all education systems, with dyslexia being the most well-documented specific learning difficulty affecting literacy development. Dyslexia is a learning difficulty that primarily affects the skills involved in accurate and fluent word reading, writing and spelling (Rose, 2006). While the fundamental process of learning to read remains the same for all children, including those with special educational needs and disabilities, students with reading difficulties may require significantly longer timeframes and more intensive support to develop proficient reading skills (Department for Education, 2023). Research demonstrates that these students often take longer to consolidate their knowledge of sound-letter relationships and require support through small, systematic steps to ensure consistent progress.

Screening for reading difficulties must be interpreted in context. In systems where instruction does not follow the Science of Reading, poor reading scores are non-diagnostic: we cannot tell whether a child's performance reflects inadequate instruction or is a persistent reading difficulty. Evidence from Malawi, with high levels of Learning Poverty, shows that a brief phonological awareness and rapid naming screener can identify students with a double deficit who have an elevated risk for reading difficulties (Bulat et al., 2020). Longitudinally, the double-deficit group showed little to no growth in oral reading fluency, while the single-deficit group improved and the no-deficit improved the most. Accordingly, systems should strengthen instruction and interpret screening results through children's response to that instruction.

The manifestation and prevalence of reading difficulties varies considerably across languages due to variations in orthographic complexity and transparency. Cross-linguistic research reveals that dyslexia appears differently depending on the characteristics of the writing system (Daniels & Share, 2017). A landmark comparative study examining word decoding development across 13 European languages found that children learning to read in English experienced profound delays in rate of acquisition compared to those learning in languages with more transparent orthographies (Seymour et al., 2003). Research examining orthographic depth across multiple languages demonstrates that the degree to which writing reflects a language's speech sounds significantly affects reading development trajectories (Ziegler et al., 2010).

For example, in transparent orthographies with consistent sound-letter relationships, such as Spanish and Italian, reading difficulties may be less prevalent and primarily manifest as challenges with reading speed and fluency rather than basic accuracy. Research in Spanish-speaking populations suggests reading difficulty rates between approximately 9% and 12%, with speed and fluency problems considered the primary characteristics rather than accuracy deficits (Defior & Serrano, 2017). Conversely, in opaque orthographies, such as English and French, with irregular spelling patterns, difficulties typically involve both accuracy and fluency challenges, with more complex cognitive demands placed on learners to master inconsistent spelling-to-sound mappings. Across alphabetic languages, phonological awareness predicts reading everywhere, but its relative weight shifts with language characteristics, particularly orthographic depth, so screening and intervention should be calibrated to the linguistic context (Georgiou et al., 2008).

Evidence-based instructional approaches for struggling readers

Instruction aligned with the Science of Reading, and which includes systematic phonics instruction, remains the most effective approach for teaching children with reading difficulties across different writing systems. Comprehensive meta-analytical research demonstrates that students with reading difficulties benefit most from explicit, systematic instruction in letter-sound relationships (NICHD, 2000). The effectiveness of phonics instruction for struggling readers has been confirmed across different alphabetic writing systems, though the duration and intensity of instruction must be adapted based on language characteristics. Research consistently shows that dyslexic pupils may take longer than typical learners to embed knowledge of letter-sound correspondences and require support through small incremental steps, but systematic synthetic phonics remains the best evidenced approach for teaching decoding to these students (Department for Education, 2023). Current evidence is not LMIC-led, yet as more children in these settings receive sustained, high-quality reading instruction, we anticipate local studies will show the same benefits for struggling readers.

Students with reading difficulties require intensive implementation of all six core reading skills with specific adaptations. The current scientific understanding of dyslexia and reading difficulties emphasizes that these conditions affect the complex network of skills underlying reading development rather than representing completely separate learning processes (Snowling et al., 2020). Research confirms that struggling readers need the same foundational skills as all students—oral language, phonological awareness, systematic phonics, reading fluency, reading comprehension, and writing—but delivered with greater intensity, frequency, and duration. Key evidence-based adaptations include:

- **Extended phonological awareness instruction:** Research demonstrates that phonemic awareness training produces particularly strong effects for students with reading difficulties, with early intervention studies showing significant improvements in phonological awareness skills that transfer to reading and spelling performance (Brady et al., 1994; Byrne & Fielding-Barnsley, 1991).

- **Systematic phonics with increased practice:** Students with reading difficulties require more repetition and practice opportunities to master

sound-letter relationships, often needing to practice multiple times, patterns that typical readers acquire more easily through regular classroom instruction.

- **Intensive fluency development:** Building reading speed and accuracy requires extensive guided practice with texts at appropriate difficulty levels, often requiring small-group or individual instruction to provide sufficient practice opportunities.

- **Multisensory approaches:** Incorporating visual, auditory, and kinesthetic elements can strengthen learning and develop stronger brain connections for students who struggle with traditional teaching methods, though these approaches should supplement rather than replace systematic phonics instruction.

Cross-linguistic considerations for addressing reading difficulties

As mentioned earlier, students with reading difficulties face different challenges depending on their language's writing system, and teaching methods must be adapted accordingly. Research across many languages shows clear patterns that can guide education policy.

In languages with simple spelling patterns (such as Spanish, Italian, Welsh, Greek, Finnish, and Czech), students with reading difficulties can usually learn basic reading skills but struggle with reading speed and fluency (Perfetti & Harris, 2017; Verhoeven & Perfetti, 2017). Schools using these languages should focus on building reading speed through lots of reading practice rather than spending too much time on letter-sound instruction. However, they still need systematic teaching of basic skills.

In languages with complex spelling patterns (such as Danish, English, French, and Portuguese), students with reading difficulties struggle with both accuracy and speed. They need longer, more intensive instruction in letter-sound relationships, plus strong vocabulary, and comprehension support (Perfetti & Harris, 2017; Protopapas, 2017). These languages are harder to

learn because their spelling rules are irregular and inconsistent, requiring more time and practice to become fluent readers.

In languages that use symbols representing syllables, including Kannada, Hindi, Tamil, Bengali, and other South Asian languages, reading difficulties show different patterns. Students struggle with matching symbols to sounds, especially when symbols represent complex sound combinations. They also have trouble with rapid naming tasks and breaking down syllables (Nag, 2017). Students face particular challenges with spelling when the symbol-to-sound relationships are unclear and with understanding how word parts combine to create meaning. They need intensive instruction in learning symbols combined with teaching about word structure (Nag, 2017). Hindi speakers with reading difficulties struggle with symbol learning and sound processing, while Sinhala speakers show slow rapid naming skills (Gupta, 2004, as cited in Nag, 2017; Wijayathilake & Parrila, 2013, as cited in Nag, 2017).

In character-based writing systems like Chinese, students with reading difficulties struggle more with recognizing individual characters, understanding word meanings, and visual processing. They need intensive teaching focused on visual pattern recognition and meaning-based learning strategies (Chen & Pasquarella, 2017). Japanese presents unique challenges across its different writing systems, with students needing different types of support depending on which script they are learning (Koda, 2017).

Policy Implications for supporting struggling readers

Education systems must build systematic support for students with reading difficulties into their literacy policies and practices. Based on extensive cross-linguistic research evidence, policymakers should consider the following recommendations:

- **Early identification and intervention systems:** Implement regular screening assessments to identify students at risk for reading difficulties in first grade, allowing for immediate intensive

support before children fall significantly behind their peers. Research demonstrates that early phonemic awareness training produces lasting benefits, with effects maintained across multiple years of follow-up assessments.

- **Differentiated instruction within universal frameworks:** Train teachers to deliver the six core reading skills at varying levels of intensity within the same classroom, whilst ensuring that struggling readers receive additional practice and support without being excluded from grade-level content.
- **Extended time allocations:** Recognize that students with reading difficulties typically require substantially longer timeframes to achieve reading proficiency than typical learners, and adjust curriculum pacing and assessment expectations accordingly while maintaining high expectations for ultimate achievement.
- **Specialized teacher preparation:** Ensure that all primary teachers receive training in recognizing and supporting reading difficulties. Moreover, invest in specialized training for special education professionals who can provide targeted support for children with disabilities or who require advanced support.
- **Language-appropriate interventions:** Adapt intervention strategies based on the specific characteristics of the language of instruction, emphasizing fluency development in transparent orthographies and extended phonics instruction in opaque systems, while ensuring that core principles of explicit, systematic instruction remain consistent.

Supporting students with reading difficulties requires intensifying evidence-based practices. Research across multiple languages and writing systems demonstrates that the same instructional principles benefiting all students—explicit, systematic, comprehensive teaching of core reading skills—prove most effective for struggling readers when delivered with appropriate intensity and duration. Education systems that successfully address reading difficulties, combine universal high-quality instruction with systematic support, for students who need additional help. This ensures that orthographic complexity or individual learning differences do not prevent any child from becoming a skilled reader.

Section 3.4: Implementation of effective literacy programs in classrooms

Implementation challenges

Education systems in many LMICs face persistent and complex challenges that undermine reading instruction. Teachers often receive inadequate pay, limited resources, and insufficient training. Classes are often very large, and students in the same class can have very different reading abilities, which makes it hard for teachers to help everyone. In many cases, students—and even teachers—are not proficient in the language of instruction (Jhingram, 2009). Teaching and learning resources are often lacking, further complicating efforts to improve student outcomes. In many places, curricula expect students to progress at unrealistic rates, leaving most children behind (Pritchett & Beatty, 2012). As a result, students often have persistently low reading proficiency across all grades and make only slow progress throughout primary school.

International assessment data, from both LMICs and HICs, highlight the importance of coherent school conditions for reading achievement. Analysis of PIRLS data reveals that schools with a strong emphasis on academic success—characterized by clear curricular goals, high expectations, and teacher-leadership collaboration—consistently demonstrate higher reading achievement, as does greater allocated instructional time (Mullis et al., 2016a; Mullis et al., 2017). Conversely, schools reporting resource shortages show systematically lower performance (Mullis et al., 2016b), while safe and orderly school climates correlate with better reading outcomes (PIRLS, 2021). Together, these findings underscore that effective reading instruction requires systemic conditions that support learning, not only quality teaching.

Any attempt to implement evidence-based approaches must overcome these challenges. There is clear evidence that programs aligned with the Science of Reading can improve reading outcomes—but only if they are implemented effectively. This involves grappling with the challenges faced by teachers, students, education leaders, and other key stakeholders that may prevent beneficial change from occurring. Even the best designed programs rely on the quality of implementation to succeed.

Fortunately, there is increasing evidence from LMICs on the best way to deliver effective programs. This section provides an overview of some of the core drivers of successful implementation. Outlined below are several key evidence-based strategies that have helped countries overcome implementation challenges and achieve significant improvements in reading outcomes. While all these strategies can be effective, countries will need to prioritize among them based on their specific needs, system capacity, and starting points.

Strategy 1: provide complete, aligned support packages (structured pedagogy) based on the Science of Reading. The most successful reading programs in LMICs share a common approach: they provide teachers with comprehensive, aligned support rather than piecemeal interventions. This approach, called 'structured pedagogy,' includes a package of key integrated components: detailed lesson plans and materials that show exactly what to teach each day, and how to teach it; student books that are aligned with the lessons plans; practical teacher training on how to use these materials; and ongoing coaching to help teachers improve their practice.

Evidence shows this integrated approach works: six of the eight highest-performing reading programs in LMICs used structured pedagogy (Stern et al., 2023). The 2023 GEEAP report identified it as one of the most cost-effective education interventions available (Akyeampong et al., 2023). The key is alignment—the training teaches teachers to use the lesson plans, the coaching reinforces their training, and the materials support what the teachers have learnt. Without this alignment, individual components often fail.

In practice, most structured pedagogy programs for literacy have used teaching methods that are informed by the Science of Reading. They tend to be especially effective because they provide teachers with the support needed to translate these principles into classroom practice. Structured pedagogy works best when it embeds and reinforces the Science of Reading by helping teachers develop students' six core reading skills.

Strategy 2: design materials teachers will actually use. Research across multiple countries reveals what makes teachers use (or ignore) lesson guides. Materials succeed when they match teachers' actual skill levels; are clearly formatted and present all information for one lesson on a single page; include a manageable number of activities in each lesson; and use local examples and contexts. (Piper et al., 2018b). Materials fail when they assume knowledge teachers don't have; use confusing formatting; pack in too many activities and use contexts that are unfamiliar to teachers and students.

The Malawi Early Grade Reading Activity (EGRA) program illustrates the consequences of poor design: the program experienced low teacher fidelity because the lesson plans contained too many activities and were too complicated to follow (World Bank, 2023). To avoid this issue, program designers should prioritize simplicity, usability and context-relevance when designing teacher guides and other TLMs. This can be facilitated by engaging teachers and headteachers throughout the design process, and piloting TLMs with a representative group of teachers to evaluate quality and usability and make necessary revisions. Programs should also monitor implementation fidelity to understand how the program works in classrooms. The quality of program implementation can be measured by a range of metrics, but whether the teachers use the materials provided as intended is key.

Strategy 3: train teachers in specific techniques, then support them continuously. Despite strong empirical support for the Science of Reading, significant gaps persist between research and classroom practice. For instance, observational studies in Latin America and the Caribbean reveal that systematic phonics instruction is limited, highlighting this persistent research-practice

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gap (Suárez et al., 2018). Closing this gap requires more than providing evidence and materials. It demands comprehensive systems that can change established teaching practices. Successful implementation requires not only teacher training but also follow-up coaching, administrative support, and systematic monitoring of classroom practices to ensure evidence-based methods are implemented with fidelity.

Effective teacher development follows a clear formula: teach specific skills, provide practice opportunities, then offer ongoing support (Alvarez-Marinelli et al., 2023; Mejia, 2021; Popova et al., 2022). The *Learning* at Scale study (Stern et al., 2023) highlighted the need to focus coaching on pedagogical improvement. Ongoing support can be provided through expert coaches or school-based communities of practice (Ralaingita, 2021), depending on cost and staff availability. Both initial and in-service teacher education systems must equip teachers with evidence-based reading instruction skills through updated curricula, quality practicum experiences, mentorship systems, and career-long professional learning (World Bank, 2023), grounded in the science of learning and reading.

Explicit, systematic instruction and learner-centered approaches are complementary, not contradictory, and can work effectively together (UNESCO & UNICEF, 2024). Explicit instruction provides scaffolding and learning progressions that enable differentiation, targeted support, and adaptive pacing (Ralaingita, 2020). Structured pedagogy provides evidence-based frameworks within which teachers can exercise professional judgment. The most effective programs combine systematic skill instruction with responsive teaching that acknowledges children's backgrounds, interests, and developmental stages (UNESCO, 2024).

Strategy 4: support teachers through the process of adopting new practices. For many teachers, implementing the instructional strategies outlined in the previous sections of this report will require adopting and sustaining unfamiliar routines and practices in their classrooms. Yet many programs fail to consider the role of the teacher, and how they are making decisions about their practice (Piper & Benveniste, 2024). Teachers face a range of barriers to taking up effective instructional practices, including limited time and attention, lack of clarity on what is required, limited content and/or pedagogical knowledge, or a preference for the status

quo (Flaschen et al., 2024). The World Bank's *Making Teacher Policy Work* report (2023) offers a simple framework for identifying and mitigating these barriers. All programs should ask three questions:

- **Is the change *clear*?** Do teachers understand exactly what to do differently? Can they see the difference between old and new methods?

- **Is the change *doable?*** Can teachers implement this with 50+ students? Do they have the materials and time required?

- **Is the change *rewarding*?** Will teachers see student improvement quickly? Does the system recognize and support teachers who change?

Strategy 5: build government ownership from the start. Reading programs succeed when governments support them and see them as a priority. Lasting change requires embedding evidence-based reading instruction into the core structures of education systems (UNESCO, 2024; UNESCO & UNICEF, 2024), spanning multiple policy domains with coordinated government action. Successful large-scale programs share certain key characteristics (Hwa et al., 2024; Piper & Dubeck, 2024; Stern et al., 2023):

- **Political commitment: Senior officials champion the program publicly and consistently. This requires aligning program goals with existing government priorities and plans, and using evidence to build consensus and buy-in on the specific methods to be implemented.**
- **Stakeholder engagement**: This requires early and frequent engagement and co-creation with stakeholders (including teachers, district and sub-district officials) to contextualize design to local needs and foster a sense of ownership.
- **System integration**: Successful programs work with—and not against—local systems. This entails, for instance, aligning TLMs with the official curricula[11], assessments[12], and working through local (state, district, sub-district) school officials and headteachers.
- **Sustainable funding:** Effective teaching practices shouldn't cost more than ineffective ones once established. However, programs require sustained investment in materials, training, coaching, and assessment integrated into education budgets rather than external funding (World Bank & UNESCO, 2024).

Strategy 6: design for sustainability and institutionalization. Across LMICs, sustainable education programs are those that have been designed to institutionalize changes in the system's policies, practices and procedures. This includes changes in curricula, monitoring tools and procedures, language policy, and teacher professional development (Stern et al., 2023). One approach is to build local capacity in order to facilitate a gradual transfer of responsibility to local actors. This means actively engaging local education actors (at different levels) in essential implementation functions—from materials development to teacher coaching and evaluation (Piper & Dubeck, 2024). The *Learning at Scale* study (Stern et al., 2021) cites the case of the SERI (Scaling Up Early Reading Intervention) program in India, where teacher coaching was initially led by a combination of external facilitators and government-employed cluster coordinators, who worked together on joint school visits. The process of mentoring built the skills of the cluster coordinators, who eventually led teacher coaching during the final phase of the program and thereafter.

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11   Evidence-based reading instruction must be reflected in national curricula, learning standards, and assessment systems, specifying reading subskills by grade level and allocating sufficient instructional time (Shanahan, 2022). The curriculum should reflect realistic learning progressions and avoid overambitious curricula (Abadzi, 2016; Pritchett & Beatty, 2015). The Global Proficiency Framework (GPF) for reading offers a progression model for grades 1-9 reform (UIS, 2020a).

12   National and regional assessment systems should align with evidence-based reading instruction by measuring the key subskills that research identifies as essential. Early grade reading assessments such as EGRA, and other formative assessments such as the Indicadores de Progreso de Aprendizaje de Lectura, Escritura y Matemáticas (Jiménez, et al., 2021; Jiménez & León, 2023), provide teachers with actionable data to guide instruction, while national examinations signal priorities to teachers and parents (Dubeck & Gove, 2015; UNESCO Institute for Statistics, 2020). Most importantly, they should inform teachers' day-to-day practice, school-level decision making and school accountability to students and parents.

Programs also need realistic expectations about how long it takes for impacts on learning to emerge. This means maintaining a consistent focus on learning throughout the system, and tracking shorter term proxies for learning, such as the quality of implementation.

Structured Pedagogy and Teacher Professionalism

Structured pedagogy supports rather than undermines teacher professionalism when implemented appropriately. The UN Secretary-General's High-Level Panel on the Teaching Profession emphasizes teacher agency, autonomy, knowledge, competence, and responsibility as central to quality education (Internacional Labor Organization [ILO], 2024). These principles are fully compatible with evidence-based structured reading approaches when programs are designed with teacher professionalism in mind. Just as medical professionals use evidence-based protocols while exercising clinical judgment, or pharmacists follow strict protocols to dispense and create customized medications through compounding, teachers can use structured instructional frameworks while applying their professional expertise to meet individual student needs. In this regard, teaching, as Carnine explains (2000), would be moving towards a "mature profession", characterized by a shift from individual judgments to judgments constrained by data and evidence.

Structured pedagogy, properly understood, represents this same professional approach to teaching. Piper and Dubeck (2024) define structured pedagogy as the coordination and alignment of four essential components: teacher materials (including teacher guides), student materials (including assessments), teacher training, and ongoing professional support. This definition challenges the misconception that structured pedagogy is solely for contexts with limited teacher capacity. Teacher guides within structured pedagogy frameworks exist along a continuum of structure, from highly prescriptive scripts that provide every word to be said, to flexible lists of activities and instructional sequences that teachers can

adapt (Akyeampong, et al., 2023; Piper & Dubeck, 2024; Piper et al., 2021). The appropriate level of structure depends on multiple factors including teacher expertise, curricular complexity, student needs, and the specific learning objectives. Importantly, when implemented well, structured pedagogy supports, rather than undermines, teacher professionalism and enables even highly trained teachers to deliver evidence-based instruction responsive to diverse learner needs (Piper & Dubeck, 2024; Piper et al., 2021).

Section 3.5: Cost-effectiveness

Evidence-aligned literacy instruction may be more cost-effective than alternatives. The previous sections demonstrated that reading programs that are aligned with the Science of Reading are more effective than alternative approaches—producing superior reading outcomes. But how do they compare in terms of cost-effectiveness, or the cost for each unit of outcome? While data on program costs is scarce, other data supports the argument that evidence-aligned instruction may be more cost-effective than alternatives. A framework for comparing the cost-effectiveness of evidence-aligned reading programs against alternatives could consider: (i) possible interactions of the Science of Reading with cost-effective instructional formats such as structured pedagogy; (ii) the effect of achieving better literacy outcomes for every hour of class time; (iii) savings from having a lower likelihood of remediation, grade repetition and dropout; (iv) the compounding benefits of evidence-aligned instruction, including for multiple cohorts.

Cost-effectiveness of structured pedagogy programs

The principles recommended by the Science of Reading are frequently incorporated into structured pedagogy programs. As explained in Section 3.4, structured pedagogy is a specifically designed, integrated package of investments to improve classroom teaching. Key elements include teacher guides with daily

lesson plans, student books and learning materials, and teacher training and ongoing coaching. While structured pedagogy can in principle apply to any subject or teaching methodology, structured pedagogy programs for reading in LMICs have recently incorporated the principles recommended by the Science of Reading, emphasizing explicit and systematic instruction in oral language, phonological awareness, phonics, vocabulary, comprehension, and writing (Piper & Dubeck, 2024).

Structured pedagogy programs are one of the most cost-effective educational interventions in LMICs. The Global Education Evidence Advisory Panel (GEEAP) has previously identified structured pedagogy as one of the top "smart buys" in education and one of the most cost-effective types of education interventions in LMICs. Research findings include the following:

- An analysis covering 52 LMICs estimates that structured pedagogy programs generate learning gains equivalent to three additional years of schooling for every $100 spent per child (Angrist et al., 2025).
- Further, modeling suggests that scaling structured pedagogy and targeted instruction to 90% of primary-aged children in LMICs could cost $18 per student annually while yielding $65 in benefits per $1 spent (Angrist et al., 2023).
- However, at least one study finds that costs can be high: an analysis of 39 USAID-supported structured pedagogy programs found average costs of $200 per student per year—double current spending in those contexts—for fluency gains of about 3 correct words per minute from a base of 13, a moderate effect size (Sandefur et al., 2023).

Importantly, these analyses evaluate complete structured pedagogy packages; the specific contribution of Science of Reading methods versus other components hasn't been isolated. Even using conservative estimates, the returns justify the investment when compared to continuing ineffective practices.

Effects on the likelihood of remediation, repetition and dropout

Early grade reading programs reduce the need for costly remedial or special education interventions later. High-quality reading instruction in the early years prevents reading difficulties, which are more expensive to remediate at later stages (Snow et al., 1998; van der Weijden et al., 2024). Colombia's experience illustrates the dramatic difference. A first-grade, evidence-based intervention with teacher training yielded learning gains equivalent to one full grade level for every $100 spent, while a (companion) remedial program for struggling third graders achieved only 30% of that improvement (Alvarez Marinelli et al., 2023). In addition, the first-grade intervention reduced the need for third-grade remediation by one-third, leading to cost savings of approximately $10 per child.

Evidence-based reading programs can also reduce costs by reducing the likelihood of repetition and dropout. In South Africa, children who participated in an early reading program had lower repetition rates at the end of primary school, demonstrating sustained benefits (Stern et al., 2024). The principle is clear: investing in effective initial instruction costs helps avoid costly measures to help children catch up later.

Long-term and spillover effects of evidence-aligned instruction

Programs aligned with the Science of Reading may produce learning gains that persist longer than alternatives. Evidence-based literacy interventions in early grades have sustained effects, with benefits persisting years after program completion. In South Africa, students who received structured reading instruction in Grades one to three still outperformed peers in Grade seven—four years after the program ended (Stern et al., 2024). In Uganda, five years after a literacy intervention, participants maintained 79% of their English reading gains and 55% of their local language gains, equivalent to 4.4 and 1.5 additional years of schooling respectively, compared to non-participants (Buhl-Wiggers et al., 2023). In Colombia, first-grade

reading interventions continued showing effects through Grade three (Alvarez Marinelli et al., 2023). This persistence multiplies cost-effectiveness: a one-time investment continues generating returns for years.

Training teachers on evidence-aligned approaches also creates multi-year benefits. When teachers learn evidence-based reading instruction, they continue using these methods with future classes, multiplying the return on investment. Data from South Africa quantifies this multiplication effect: teachers trained in 2015 were still using improved methods in 2018, benefiting three additional cohorts of students. This increased the program's cost-effectiveness by 44-55% (Cilliers et al., 2022a). Similarly, research from Peru indicates that teacher coaching impacts last for at least a year beyond program completion (Majerowicz & Montero, 2018). Standard cost analyses that only count immediate beneficiaries significantly underestimate the true return on teacher training investments.

Cost-effectiveness analyses should also take into account the spillover effects of programs aligned with the Science of Reading. In the aforementioned Grade 3 remediation study in Colombia, tutored students not only improved in reading but also posted unexpected gains in mathematics, and their untutored classmates in the same classrooms achieved roughly one-third of the literacy improvement of tutored peers (Alvarez-Marinelli et al., 2021). Accounting for these cross-subject and peer spillover effects makes the program's total benefits nearly 50% larger than the direct effects alone. These are additional gains that require no extra expenditure, thereby raising the return on investment (Berlinski et al., 2023).

Influence of program design on cost-effectiveness

The selection of program components can dramatically impact cost-effectiveness. Research from Pakistan and Kenya highlights the importance of selecting the right mix of program components. A cost-effectiveness analysis of the Pakistan Reading Project (PRP) found that the most effective intervention package included teaching materials, teacher training, and

coaching—while monthly teacher peer-learning groups did not add sufficient value to justify their cost (Byrne et al., 2023). Similarly, Kenya's Primary Math and Reading Initiative (PRIMR) showed that adding teacher guides to an intervention package for just $0.16 per student doubled the program's cost-effectiveness (Piper et al., 2016a).

The design of individual program components also influences cost and results. For instance, how you deliver teacher training matters. Evidence from South Africa suggests that teacher coaching is more cost-effective than centralized training, as it yields double the learning gains despite higher costs (Taylor et al., 2017). The impact of technology-assisted teacher support varies, with studies from Kenya and South Africa showing no additional cost-effectiveness, whereas a study in Senegal found virtual coaching more cost-effective than in-person coaching (Bagby et al., 2022; Cilliers et al., 2022b; Piper et al., 2016a).

Moreover, the scale-up of projects is a test of cost-effectiveness. While programs that follow the principles of the Science of Reading have proven highly cost-effective in controlled studies, ensuring the same level of impact when programs scale still remains a challenge. Maintaining quality at scale requires strong mechanisms for training teachers, monitoring successful classroom implementation, and continuous learning assessment.

Conclusions

Preliminary research suggests that evidence-based reading programs may be more cost-effective than alternatives. Still, further research is needed. To date, the costs associated with creating programs aligned with the Science of Reading have not been adequately documented and analyzed. Remaining questions include: How do the costs of new or revamped reading programs compare to current practices? What are transition costs, such as the costs of re-training teachers and replacing existing teaching materials? What does each program component cost separately, and what is the marginal impact of each component on learning?

Section 4: Conclusions and recommendations

Luminos student Emmanuel takes a turn leading the class in a literacy activity, saying vowel letters with corresponding movements. (Photo by John Healey for the Luminos Fund)

The evidence is overwhelming: we know how to teach children to read. This report analyzed 151 studies from LMICs covering over 167 languages, and the conclusion is clear—when education systems use teaching methods aligned with the Science of Reading, children learn to read successfully. The learning poverty crisis affecting hundreds of millions of children is not inevitable; part of the key to solving it lies with using effective, evidence-based instruction. When children receive direct, structured instruction in the six essential reading skills identified through research, they learn to read better and faster than with other approaches. The evidence base is now strong enough for policymakers to act with confidence.

Transforming reading instruction requires sustained effort across multiple fronts. Developing new curricula, creating quality materials, retraining teachers, and tracking progress. Current approaches have failed—most children in LMICs finish primary school unable to read properly. This report provides a roadmap for change based on what has worked in similar contexts. While the core principles of effective reading instruction are universal, programs must be adapted to local languages, writing systems, and cultures. For example, teaching Arabic requires attention to its right-to-left script, while in transparent orthographies, students acquire phonics more quickly, all things being equal. As countries implement these evidence-based approaches, they should document what works in their specific contexts, contributing to our growing understanding. Every child deserves reading instruction that actually works, based on methods proven by research, not tradition or ideology.

The growing evidence from LMICs, spanning hundreds of languages beyond English, has reached a critical mass. We no longer need to wonder whether research from wealthy countries applies elsewhere. We now have proof from similar contexts that these methods work. Countries must now implement these proven methods at scale. Based on the evidence presented in this report, we make the following recommendations for immediate action:

1. **Make universal literacy a non-negotiable national priority.** Publicly commit that every child will learn to read by the end of primary school. This isn't aspirational—with proper instruction, virtually all children can become skilled readers. Political leaders must champion this goal consistently, allocate necessary resources, and hold the system accountable for results.

2. **Choose an appropriate language of instruction. Whenever possible, teach initial reading in the language children speak at home.** In multilingual countries, this decision dramatically affects success rates. Children learning in their mother tongue need two to three years to become readers; those learning in a second language might require more, including intensive oral language support. If political or administrative constraints require second-language instruction, budget for the additional time, materials, and the required teacher training. Ignoring the language mismatch guarantees failure.

3. **Assess whether current instruction aligns with the Science of Reading, and use the findings to set reform priorities.** Before reforming an education system, first understand how it is performing. Assess whether schools are following the key principles of the Science of Reading outlined below. Use the results to identify which core skills are least well addressed and prioritize reforms accordingly.

4. **Develop evidence-aligned reading programs that provide comprehensive instruction on all core literacy skills:**

    *   **Oral language development: Develop oral language skills, including vocabulary knowledge, throughout primary school.** Children need to understand words before they can read them. Programs should include daily vocabulary instruction, classroom discussion, and teacher read-alouds. This is especially critical for students from low socio-economic status backgrounds or second-language learners, who may know only a few hundred words in the instruction language, versus the thousands needed for reading comprehension.

    *   **Phonological awareness: Explicitly teach children how to identify and manipulate the sounds in spoken words.** Before children can read, they must understand that spoken words are made up of individual sounds. In early grades, starting in preschool, dedicate time daily to activities like clapping syllables, identifying rhymes, and breaking words into individual sounds. Without this foundation, it will be harder for children to learn letter-sound relationships.

    *   **Systematic phonics instruction: Teach sound-letter relationships explicitly and systematically.** Children must learn which sounds each letter(s) represents and how to blend these sounds into words. This requires a structured sequence: start with simple letter-sounds, progressively add complexity, and provide extensive practice. Programs that skip phonics or teach it randomly produce struggling readers. Languages with consistent spelling (like Spanish) need less phonics time than those with complex spelling (like English or French).

    *   **Fluency: Provide extensive practice to build reading speed and accuracy.** Learning to read fluently is like learning a musical instrument: it requires sustained practice over years. Once children can read words accurately, the amount they read becomes the key to continued improvement, as children need extensive reading practice to build vocabulary and comprehension skills. Thus, programs must ensure children read aloud daily, provide books at appropriate difficulty levels, and create reading opportunities beyond school hours.

- **Reading comprehension: Teach comprehension strategies and build knowledge about the world.** Reading comprehension requires two things: strategies for understanding text (like summarizing and questioning) and knowledge about topics being read. Programs should explicitly teach comprehension techniques while simultaneously building children's understanding of science, history, and culture. A child cannot understand a text about rainfall without knowing about the weather; comprehension and knowledge are inseparable.

- **Writing: Include daily writing instruction from the first grade.** Writing reinforces reading—when children write words, they strengthen their understanding of letter-sound relationships. Start with letter formation and spelling, progress to sentences, then to paragraphs and stories. Children who write regularly become better readers, and better readers become better writers.

5. **Ensure that these skills are taught explicitly, systematically, and comprehensively.**

   - Explicit instruction means teachers directly demonstrate and explain each skill, providing clear examples before students practice independently.

   - Systematic instruction means that skills are taught in a logical order, following a planned scope and sequence.

   - Comprehensive instruction means addressing all six skill areas, since weakness in any single area can prevent children from becoming successful readers.

   Additionally, programs should provide students sufficient time to practice reading—including ample opportunities to engage with books, read a variety of texts independently, and build a culture of reading.

6. **Provide teachers with complete support packages, not piecemeal interventions.** Successful implementation requires aligned components, including:

   - Detailed daily lesson plans that teachers can follow

   - Books, textbooks and other resources for students

   - Practical initial teacher training, and ongoing professional development and coaching to support teachers

   - Standardized diagnostic and formative assessments so that teacher can evaluate student progress

   Programs fail when any component is missing or when materials are too complex for real classroom conditions. Therefore, testing all materials with typical teachers before scaling up is critical.

7. **Embrace national and local research about effective reading instruction.** The core principles of the Science of Reading are universal, but successful programs adapt certain aspects of instruction to language features, contextual factors, and individual student needs. As policymakers draw on the expanding evidence from around the world, they should fund, carry out, and use high-quality evidence from their own contexts and systems to ensure the highest levels of success in literacy for their students.

Annex: Research Methods, and Geographic Distribution of LMIC Studies Cited

We cite 151 studies from low- and middle-income countries. These studies are grouped as follows:

Table 1: Research Methods

Research method	Number of Studies
Randomized experiments	45
Quasi/Natural experiments	34
Observational studies	49
Meta-analyses	8
Systematic reviews	7
Other	8

The *"Other" category included ten studies: two large-scale benchmarking and diagnostic studies, two instrument-development studies, one policy and curriculum analysis, one technical review of instructional materials, and one global landscape review of early grade literacy research.

This count excludes two additional groups of studies: (1) six qualitative studies examining initial teacher training programs in Central America, and (2) PIRLS studies conducted in low- and middle-income countries.

Table 2: Geographic Distribution

Region	Number of Studies
Sub-Saharan Africa	64
Latin America & Caribbean	34
South Asia	11
Middle East & North Africa	9
East Asia & Pacific	8
Europe & Central Asia	3
LMICs*	19
Other**	3

Studies were categorized as *"LMICs" when they either: (1) Did not specify individual countries but collectively referred to the sample as low- and middle-income countries, or (2) Included more than ten LMIC countries.

Studies were categorized as **"Other" when they: (1) Focused on a specific language group (one study on Arabic-speaking countries; one on Spanish-speaking countries), or, (2) Included fewer than ten countries from multiple regions (one study).

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