A Critical Review of Evidence-Based Literacy Instruction in Montessori Classrooms

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Abstract: Persistent national declines in early reading outcomes demand rigorously evidence-based literacy instruction. Although Montessori education is dismissed as purely constructivist and child-led, its literacy practices incorporate explicit, systematic, sequential, and multisensory methods that align closely with contemporary science-of-reading frameworks. This critical review synthesizes existing literature to examine how Montessori classrooms cultivate foundational reading skills—including phonological awareness, decoding, vocabulary, and comprehension—through developmentally responsive, hands-on, and sequential experiences. Key elements such as control of error, child autonomy, and structured teacher guidance are clarified, demonstrating how Montessori education integrates learner independence with systematic skill development. Empirical evidence from randomized controlled trials, large-scale analyses, meta-analyses, and teacher perspectives consistently shows that high-fidelity Montessori literacy instruction supports reading growth, executive function, and social-emotional development, with gains amplified by sustained program exposure. These findings suggest Montessori education effectively bridges the perceived divide between child-centered pedagogy and evidence-based literacy instruction, offering a model that is developmentally responsive and academically robust. Ensuring teacher expertise, instructional fidelity, and multiyear engagement is essential to translating Montessori pedagogy's evidence-based practices into meaningful literacy outcomes for diverse and at-risk learners.

Persistent national declines in reading outcomes have highlighted the urgent need for evidence-based early literacy instruction, especially for children from diverse backgrounds and those at risk for reading difficulties. Early literacy instruction has increasingly turned to the science of reading—a cumulative, interdisciplinary body of research on how the brain learns to read, commonly interpreted through instructional frameworks such as the five pillars of reading instruction, the Simple View of Reading (National Center on Improving Literacy, 2017), Scarborough's Reading Rope (Lexia, 2024), and Structured Literacy (Lexia, 2025b). These frameworks emphasize explicit, systematic, cumulative, multimodal, diagnostic, and responsive instruction across foundational

literacy skills (Lexia, 2025a). As synthesized by Moats (2020b), this research base reflects more than 40 years of rigorous, federally funded investigation across cognitive science, linguistics, neuroscience, and education, driven by the persistent and unacceptable prevalence of reading failure in the United States, disproportionately affecting children at-risk.

This body of evidence shows a clear consensus that reading does not develop naturally through exposure or maturation, but requires explicit, systematic, and cumulative instruction—contrary to long-held assumptions that have persisted despite decades of converging scientific evidence (Lyon, 1998). One of the most effective tools for promoting reading growth is explicit instruction, a structured and systematic methodology by which teachers clearly state the purpose and rationale of a new skill, demonstrate the target, guide students through supported practice, provide feedback, and continue until mastery is achieved (Archer & Hughes, 2011). Explicit instruction ensures students clearly understand what they are learning and why, emphasizing scaffolded clarity.

Montessori Education in Literacy

Montessori education occupies a paradoxical place in literacy research. Although classrooms demonstrate robust, replicable gains in literacy, executive function, and equity (Lillard & Else-Quest, 2006), it is often dismissed as purely constructivist (Leonard, 2020; Lillard, 2021; Mavrič, 2020). This label misleads many to assume Montessori classrooms cannot deliver explicit, systematic instruction—a claim directly contradicted by the pedagogy itself. Montessori children engage in self-construction precisely because they have received highly explicit, step-by-step guidance (M. Montessori, 1967a). Highly trained teachers model every action with precision, emphasizing critical points, so the child can work independently (Joosten, 2013; Lillard, 2007).

Montessori Literacy and Foundational Reading Skills

Montessori literacy practices effectively support foundational reading skills, including phonological awareness, decoding, and language comprehension, in ways that align closely with evidence-based research. These practices use structured, sequential, and multisensory instruction, thereby giving children, including diverse and at-risk learners, explicit and systematic guidance in the building blocks of reading, consistent with science-of-reading principles. This structured support also enhances children's motivation, which drives engagement and fosters sustained effort, persistence, and learning (Klauda & Guthrie, 2015). Research demonstrates that early, targeted instruction in these core skills is essential for developing proficient readers and preventing reading difficulties before they arise (Scarborough, 2001).

Science-of-reading research further underscores the importance of explicit, systematic instruction in foundational skills. Snowling and Hulme (2011) highlight that effective reading instruction should target the underlying causal skills of reading, such as phonological awareness and letter–sound knowledge, and should be delivered early to maximize impact. Stanovich notes that children who begin reading with weak foundational skills risk cumulative disadvantage, as limited decoding and word recognition can hinder comprehension, vocabulary growth, and overall academic engagement (The Children of the Code Project, 2010). Montessori literacy practices, with their multisensory, structured, and developmentally responsive approach (M. Montessori, 1967a, 1967b), offer a scientific pedagogy that aligns with these evidence-based principles and supports meaningful reading growth for all children, including diverse and at-risk learners.

Purpose of the Review

This critical review argues that Montessori education, when implemented with fidelity, serves as a powerful bridge between developmentally appropriate pedagogy and structured, evidence-based literacy instruction. By combining systematic phonics, multisensory materials, and deliberate sequencing with explicit, systematic instruction in phonological awareness, decoding, and language comprehension, Montessori classrooms uniquely support the literacy and oral language development of children, including diverse and at-risk learners. For a foundational description of Montessori literacy practices and the broader interconnected pedagogy, see *Dr. Montessori's Own Handbook* (M. Montessori, 1965a). Realizing these benefits of literacy and oral language advantages depends on careful attention to teacher preparation, instructional fidelity, and sustained program exposure—challenges that must be addressed to fully harness Montessori instruction's potential in contemporary literacy education.

To advance this argument, the review proceeds in four parts. First, it examines the historical and theoretical foundations of Montessori literacy instruction, including its developmental, scientific, and pedagogical origins, with particular attention to its structured, sequential, and developmentally responsive design. Second, it situates

Montessori literacy instruction within contemporary science-of-reading frameworks, examining how Montessori practices align with evidence-based principles in the Five Pillars of Reading, the Simple View of Reading, Scarborough's Reading Rope, and Structured Literacy. Then, it interrogates common misinterpretations of Montessori principles—particularly child autonomy, teacher guidance, and control of error, a system in which materials or processes allow children to discover and correct mistakes themselves (Soholt, n.d.)—and clarifies how these elements function together to provide explicit, structured, and developmentally responsive literacy instruction. Finally, it reviews empirical studies on Montessori literacy outcomes, examining the effects of teacher preparation, fidelity of implementation, and multiyear program exposure across diverse educational contexts.

Historical and Theoretical Foundations of Montessori Literacy Instruction

Maria Montessori, an Italian physician and educator, revolutionized early childhood education by grounding her approach in scientific observation and developmental psychology (Lillard, 2007; M. Montessori, 1967a; Mooney, 2013; Standing, 1957). Through her work with children with intellectual disabilities, she identified shortcomings in traditional methods and championed reform (Curatola, 2016). Montessori's method combines systematic observation with expertly trained educators, who skillfully balance structure and adaptability to nurture children's natural development (Standing, 1957). Crucially, these observations led Montessori to design literacy instruction as a deliberately structured, sequential, and developmentally responsive process in which language experiences are ordered, cumulative, and aligned with children's developmental readiness rather than left to incidental exposure. For example, Montessori described a carefully sequenced progression in which children first develop rich spoken language through meaningful experiences and vocabulary lessons, then engage in sound games that help them analyze words into their component sounds, followed by multisensory exploration of sound–symbol relationships through use of materials such as the Sandpaper Letters (Ramani, n.d.). Once these auditory and kinesthetic foundations are established, children use the Movable Alphabet to construct words before formal handwriting emerges, often resulting in the well-documented "explosion into writing" when the underlying linguistic and motor foundations are sufficiently prepared (M. Montessori, 2007, p. 91). These principles directly informed Montessori's approach to literacy instruction, which emphasizes careful observation, deliberate sequencing of language experiences, and the use of structured materials calibrated to developmental readiness.

Building on these foundations, Montessori's principles—rooted in her interdisciplinary expertise in psychology, anthropology, and medicine (Curatola, 2016)—emphasize a holistic approach integrating cognitive, social, and emotional development (Bennetts & Bone, 2019; Demangeon et al., 2023). This vision guides educators to nurture the whole child (Grazzini, 2004), recognizing how these developmental domains interact and support one another, with deep concentration fostering prosocial behavior and emotional regulation (Courtier et al., 2021; Lillard, 2007; M. Montessori, 1965b). Within literacy development, this holistic integration is particularly evident, as the acquisition of spoken and written language depends on the coordination of cognitive processing, motor planning, sustained attention, and emotional regulation. Montessori (2007) emphasized that literacy development emerges through activities that integrate these processes rather than those that isolate them.

Montessori illustrated this principle through specific, sequenced language activities that simultaneously prepare both the intellectual and motor components of writing. For example, children analyze the sounds within spoken words and construct them by using the Movable Alphabet, selecting and arranging letter symbols to represent each sound (M. Montessori, 2007). In this activity, children engage in phonological analysis and sustained attention while physically manipulating letters to form words, enabling the construction of written language before the mechanical act of writing. Montessori (2007) explained that these "word-building exercises" with the Movable Alphabet prepare the way for reading "without books" and for writing "without actually writing," allowing children to experience written language "delivered from its mechanisms" (p. 88).

She further emphasized that "the hand, too, therefore, needs its own preparation" (M. Montessori, 2007, p. 88), noting that the movements needed for writing must be developed through separate exercises which firmly establish the necessary motor coordination. Such activities cultivate control of the hand as a "living machine" (p. 88) that must be trained through purposeful movement so it can serve the intelligence. Through this method, the intellectual analysis of language and preparation of the hand develop through distinct yet complementary pathways, allowing cognitive

processes, motor coordination, and concentrated engagement to develop in harmony. This developmental interdependence aligns with Montessori's educational approach that encourages educators to guide students according to their developmental needs (Frierson, 2016; Gutek & Gutek, 2016; Lillard, 2007), thereby cultivating truly autonomous, self-directed learning (Demangeon et al., 2023).

A key principle underpinning this child-centered model is the concept of sensitive periods—critical windows when children are particularly receptive to specific skills and concepts (Lillard, 2007). Montessori identified these phases through close observation and designed practices that align with each child's natural developmental trajectory (M. Montessori, 1967a; Standing, 1957). Importantly, sensitive periods do not imply unstructured discovery; rather, they provide the theoretical justification for precisely timed, explicitly sequenced, and developmentally responsive instruction. Montessori identified sensitive periods for language development in early childhood, during which children demonstrate heightened receptivity to phonological patterns, symbol–sound correspondences, and written expression. Research supports the existence of these sensitive periods, showing that children who attend Montessori programs during their preschool years (ages 3 to 6) experience stronger long-term outcomes in adult well-being, engagement, and social trust as compared to those who attend at later ages (Lillard et al., 2025). These findings are consistent with developmental research indicating there are limited periods in early development when experience has a particularly powerful influence on the formation and organization of neural circuits (Knudsen, 2004), making early childhood an especially receptive period for language and cognitive development. As a result, children can engage deeply with materials that meet their needs and support authentic, meaningful literacy growth (Lillard, 2007).

Montessori and the Science of Reading: Evidence-Based Frameworks

Contemporary science-of-reading frameworks provide a lens for evaluating early literacy instruction. This section examines how Montessori literacy practices align with evidence-based principles across the Five Pillars of Reading—phonemic awareness, phonics, fluency, vocabulary, and comprehension—and with well-established models such as the Simple View of Reading, Scarborough's Reading Rope, and Structured Literacy. By situating Montessori instruction within these frameworks, this section highlights the systematic, sequential, and multisensory ways children develop decoding, language comprehension, and fluent reading while maintaining autonomy and engagement.

Five Pillars of Reading Instruction

The Five Pillars of Reading Instruction—phonemic awareness, phonics, fluency, vocabulary, and comprehension—are the foundational skills necessary for successful reading (National Reading Panel, 2000). Montessori classrooms address each pillar systematically, using developmentally appropriate, hands-on, and multisensory methods. By embedding these skills within meaningful and engaging experiences, Montessori instruction aligns closely with evidence-based reading practices while respecting the child's natural development.

Phonemic Awareness

Phonemic awareness is the ability to identify and manipulate individual phonemes in spoken words and to recognize that spoken language is composed of discrete sound segments that work together to form words (Brown et al., 2024; Moats, 2020a). Phonemic awareness in Montessori classrooms is cultivated through structured sound games that help children notice and manipulate the individual sounds in words (Awes, 2014; Ramani, n.d.; Slater, n.d.). These activities progress logically from identifying initial sounds to final and medial sounds, ensuring that children experience mastery through repetition and guided success. Sound games are typically presented using a small, controlled set of familiar objects arranged on a tray or basket, allowing the teacher to explicitly model careful listening and sound isolation. For example, the teacher may hold one object, clearly articulate the target phoneme (e.g., "I have something in my hand that begins with /m/."). The teacher applies the sound of the letter *m* and invites the child to identify the object by attending to the initial sound. Subsequent levels extend this work to final, medial, and sequential sounds within the same set of objects. Teachers also integrate these activities with concrete materials, grounding abstract phonemic concepts in tangible, developmentally appropriate experiences that prepare the child for later reading and writing.

Phonics

Phonics describes a predictable relationship between phonemes and graphemes—sounds and the letters

that represent them—and involves instruction that explicitly teaches these sound–symbol correspondences (Brown et al., 2024; Moats, 2020a). Phonics instruction is embedded in the child's exploration of language in Montessori classrooms through Sandpaper Letters and the Movable Alphabet. Children are introduced to grapheme–phoneme correspondences through Sandpaper Letters, tracing each symbol while hearing and articulating its corresponding sound, thereby linking tactile, visual, and auditory modalities (Awes, 2014; M. Montessori, 1964; Ramani, n.d.; Slater, n.d.). As phonemic awareness expands, children use the Movable Alphabet to represent each sound in a spoken word with its corresponding symbol, constructing words independently and discovering the alphabetic principle that demonstrates spoken language is composed of sounds mapped to letters (Ramani, n.d.; Slater, n.d.). This hands-on, systematic approach promotes phonetic understanding and word recognition, often resulting in the child's first true decoding experiences—for children of varying abilities—prior to conventional reading instruction (Awes, 2014; Slater, n.d.).

Fluency

Fluency, defined as the ability to read text accurately and at an appropriate rate—and serving as a bridge between word recognition and comprehension—is developed in Montessori classrooms through repeated, structured, and engaging literacy activities (Brown et al., 2024). Long before conventional oral reading begins, children build the foundations of fluency through extensive work with Sandpaper Letters and the Movable Alphabet, often without conscious awareness of the volume of practice involved (Joosten, 2016). As instruction progresses, children engage in systematic decoding practice through a sequence of activities. In command activities, children read short written instructions (e.g., "hop," "skip," or "dust a shelf") and act them out, linking decoding with meaningful action. Word lists provide phonetic word charts without pictures, to invite spontaneous decoding practice. Phonetic word cards are often used with peers for rapid recognition and fluency practice, and simple booklets pair pictures with single words so children can independently apply decoding skills in context. Through these varied materials, children repeatedly rehearse phonograms, blends, and common word patterns in ways that promote automatic word recognition and confidence (Zanavich, 2024; Slater, n.d.). Over time, this cumulative and prescribed sequence of phonics and sight–word instruction strengthens automaticity—providing the repeated word exposure Torgesen (2004) identifies as critical for preventing reading deficits—enabling children to transition efficiently from effortful decoding to fluent reading and comprehension (Brown et al., 2024; NAMC, 2024).

Vocabulary

Vocabulary refers to an individual's knowledge of words and word meanings, and plays a central role in reading comprehension by linking word recognition to meaning (Hennessy, 2018; Kamil & Hiebert, 2005; Perfetti & Stafura, 2014), with vocabulary breadth and depth widely recognized as markers of educated language use (Beck et al., 2013). A rich vocabulary is intentionally cultivated in Montessori classrooms through direct experiences with the natural and human world, followed by the explicit attachment of precise language to those experiences (Awes, 2014; NAMC, 2024; Ramani, n.d.). Oral language games, including Bring Me activities in which children retrieve a named object after hearing a spoken request, and command games in which children read or hear short instructions and carry them out (e.g., "bring the spoon" or "place the book on the table"), as well as classified picture cards that group related vocabulary (e.g., items in the home, transportation, animals, or plants), cultural studies, and carefully selected literature, provide repeated opportunities for children to encounter, refine, and use vocabulary in meaningful contexts (Awes, 2014; Slater, n.d.). New terminology is often consolidated through the Montessori three-period lesson, a structured technique for vocabulary learning in which the teacher introduces a term in connection with a sensory experience, then invites the child to identify or respond to the term through guided prompts, and finally encourages the child to independently recall and use the word (Clark, n.d., M. Montessori, 1965a; NAMC, 2024; Ramani, n.d.). Through this process, children progressively identify, recall, and use vocabulary independently, supporting both the depth and breadth of their lexical knowledge and strengthening foundations for later comprehension and written expression (NAMC, 2024; Ramani, n.d.).

Comprehension

Reading comprehension refers to the ability to make sense of text and depends on the integration of accurate word recognition, fluency, vocabulary, and oral language knowledge (Moats, 2020a; Singer, 2018). Comprehension in Montessori classrooms is developed through an integrated approach that combines decoding,

oral language, and meaningful engagement with ideas (M. Montessori, 1964; Slater, n.d.). Children engage in command games and reading analysis activities that require acting out and interpreting language, thereby linking syntax, semantics, and inference to concrete experience (M. Montessori, 2007; Slater, n.d.). As instruction advances from words to phrases and sentences, children learn to interpret meaning, attend to punctuation and grammatical structure, and derive both literal and implied meaning from text. Montessori describes this goal as *total reading*, or interpretive reading—reading with understanding, accuracy, and depth, in which the child receives ideas from the written word and captures the author's emotion and intent (Awes, n.d., 2014; M. M. Montessori, 2001).

The Simple View of Reading

The Simple View of Reading conceptualizes reading comprehension as the product of two essential components: word recognition and language comprehension (Gough & Tunmer, 1986). As articulated by Moats (2020a), word recognition depends on rapid and accurate mapping of speech sounds to alphabetic symbols, whereas language comprehension reflects the reader's ability to interpret words, sentences, and connected discourse as if the text were read aloud. Both components are linguistic in nature and equally necessary for proficient reading; strength in one cannot compensate for weakness in the other. Importantly, the model highlights that written language places demands on readers that exceed those of conversational speech, requiring explicit attention to phonological detail, morphological distinctions, syntactic structure, and increasingly complex vocabulary and text organization (Moats, 2020a; National Center on Improving Literacy, 2017). As demonstrated in the preceding sections, Montessori literacy instruction systematically addresses word recognition through sequenced, multisensory phonics and phonemic awareness activities, such as constructing words with the Movable Alphabet and matching written word slips to familiar classroom objects, and simultaneously supporting language comprehension via rich oral language, command games, and grammatical reading exercises in which children interpret reading experiences (M. Montessori, 2007). These practices align closely with the core assumptions of the Simple View of Reading by developing word recognition and language comprehension concurrently, ensuring that proficiency in one component does not mask weakness in the other.

Scarborough's Reading Rope

Building on the Simple View of Reading, which emphasizes the dual components of word recognition and language comprehension, Scarborough's Reading Rope illustrates how these skills develop as intertwined strands that support skilled reading through cumulative and interactive processes (Scarborough, 2001). Lower strands include phonological awareness, decoding, and sight recognition, and upper strands encompass vocabulary, background knowledge, syntactic awareness, and inferential reasoning (Lexia, 2024). Montessori instruction develops these strands in an integrated, sequential, and multisensory manner, cultivating reading skills holistically through activities that naturally link decoding and comprehension (Slater, n.d.; Ramani, n.d.; M. Montessori, 2007).

Word recognition develops as children analyze the sounds within spoken words and gradually connect those sounds to written symbols. In Montessori classrooms, children practice isolating sounds in familiar objects through oral language activities in which the teacher prompts the child to identify an object by its beginning sound and later by its beginning and ending sounds, eventually identifying all the sounds in sequence within a word. These auditory discoveries are then connected to visual symbols through Sandpaper Letters, by which children trace each letter while articulating its sound, strengthening tactile, auditory, and visual associations (M. Montessori, 2007; Ramani, n.d.; Slater, n.d.). With the Movable Alphabet, children represent the sounds they hear by selecting corresponding symbols and arranging them to build words, often composing words before they read them conventionally, thereby discovering the alphabetic principle through hands-on word construction (Brown et al., 2024; Slater, n.d.).

Reading practice then continues through structured materials such as object boxes, phonogram work, and word cards. In these activities, children decode labels for familiar objects or match written words to small items placed on a mat, reinforcing sound–symbol relationships while building reading fluency (M. Montessori, 2007; Slater, n.d.). Montessori (2007) describes exercises in which children read short written sentences that instruct them to perform an action allowing them to experience how meaning is conveyed not only through individual words but also through the order in which those words appear.

At the same time, language comprehension develops through experiences that expand vocabulary, conceptual

knowledge, and understanding of language structure. Montessori classrooms intentionally provide rich contextual learning through stories, classified picture cards that group related objects or animals, nature studies involving observation of plants and animals, and cultural explorations of geography, traditions, and music. These experiences provide the background knowledge and vocabulary that allow written language to carry meaning when children encounter it in reading (Ramani, n.d.; Slater, n.d.). Through conversations, storytelling, and later reading analysis activities that examine sentence structure and parts of speech, children begin to explore how language communicates ideas, relationships, and actions (M. Montessori, 2007; Ramani, n.d.; Slater, n.d.).

These activities illustrate the integration described in Scarborough's model: while children decode written labels for objects or read short action sentences, they simultaneously draw on vocabulary, prior knowledge, and understanding of sentence structure to interpret meaning. In this way, Montessori reading activities strengthen both the lower strands of word recognition and the upper strands of language comprehension within the same learning experiences, gradually weaving the strands of Scarborough's Reading Rope into fluent, meaningful reading (M. Montessori, 2007; Scarborough, 2001; Slater, n.d.).

Structured Literacy

Structured Literacy emphasizes explicit, systematic, sequential, cumulative, and diagnostically responsive instruction (National Center on Improving Literacy, 2024; Lexia, 2025b; Spear-Swirling, 2019). In Montessori classrooms, literacy instruction aligns with these principles while maintaining a natural, child-centered environment, where learning is embedded in meaningful, hands-on activities rather than contrived exercises. Children learn letter–sound correspondences, word analysis, and syntax through deliberate, observable experiences. In a follow-up exercise with the Sandpaper Letters, the child selects a letter and then finds objects in the environment whose names begin with that sound, explicitly linking the symbol to real-world objects in their environment. This reinforces decoding within context and strengthens connections between written symbols and spoken language in a meaningful way.

Systematic and Cumulative Instruction

A hallmark of effective literacy instruction is the systematic and cumulative progression of skills. Structured Literacy requires materials and activities to follow a logical, sequenced order from simple to complex, and each step to build on prior mastery (Spear-Swirling, 2019). Montessori methods implement this by introducing phonemes with Sandpaper Letters, then sequencing letters and constructing words with the Movable Alphabet, gradually presenting more complex phonetic and syntactic patterns. With the Movable Alphabet, children may begin by creating lists—such as names of friends, favorite foods, shapes, or parts of the body—and then progress to phrases, sentences, and eventually short narratives, allowing each step to build on prior mastery while linking writing to meaningful content. Through repeated, purposeful practice, children consolidate skills naturally within the prepared environment, avoiding artificial isolation while reinforcing cumulative learning (Farrell & White, 2018; Joosten, 2016). Unlike Structured Literacy models that are often delivered in fixed instructional blocks or tiered time allocations (Birsh et al., 2018), Montessori education embeds this cumulative sequence across extended work periods, allowing children to engage with materials for as long as mastery and purposeful repetition require. This illustrates how Montessori instruction meets the systematic and cumulative demands of Structured Literacy while remaining authentic and meaningful.

Explicit and Multisensory Instruction

Explicit instruction is central to Structured Literacy, involving direct teaching, guided practice, and immediate feedback (Spear-Swirling, 2019). Montessori activities achieve explicitness through step-by-step modeling and guided interaction that engages multiple senses simultaneously. For example, when a teacher shows a Sandpaper Letter and guides the child to trace it, three sensations develop concurrently: visual (seeing the letter), tactile (feeling its shape), and muscular (moving the fingers to form the letter), all while associating the letter with its corresponding sound (M. Montessori, 1964). This multisensory combination fixes the letter image more quickly and reliably than visual exposure alone, and muscular memory often allows the child to recognize the letter by touch even before visual identification. Similarly, using the Movable Alphabet, children construct words by selecting symbols for each sound, reinforcing auditory, visual, tactile, and motoric pathways as they assemble letters into meaningful units, making explicit the connection between phonemes, symbols, and word formation (Farrell & White, 2018;

M. Montessori, 1964). By embedding instruction in natural classroom routines rather than imposing it artificially, children receive step-by-step guidance while maintaining agency and motivation. This contrasts with interpretations of Structured Literacy that equate explicitness with rigid lesson pacing, demonstrating instead that explicit teaching can occur within a flexible, child-responsive environment.

Diagnostic and Individualized Instruction

Responsiveness to individual learners is a defining feature of both Structured Literacy and Montessori approaches. Structured Literacy requires teachers to continuously assess student progress and adjust instruction to meet individual needs (Lexia, 2025b; Spear-Swirling, 2019). Montessori teachers accomplish this in real time by observing children closely and offering scaffolds or targeted activities based on demonstrated needs. For example, if a child struggles with a particular Sandpaper Letter, the teacher may group familiar letters on a mat and ask the child to trace or identify each one, providing repeated, guided practice without singling the child out; later, the unfamiliar letter can be reintroduced individually while noting the child's progress (Joosten, 2016). Similarly, when using the Movable Alphabet, a child who misorders letters in a word is encouraged to discover errors independently: the teacher reads the word aloud slowly, allowing the child to match sounds to letters and correct placement, thereby addressing specific challenges while preserving engagement and agency (Joosten, 2016). Instruction is prescriptive yet embedded in the classroom environment, allowing each child to master skills at their own pace while remaining engaged with peers. This mirrors Structured Literacy principles—careful observation, individualized scaffolding, and attention to automaticity—while preserving the orderly and child-centered context of Montessori education.

Interpretive Tensions between Montessori Education and Science-of-Reading Frameworks

Some researchers and policymakers describe Montessori education as aligned with constructivist pedagogy (Leonard, 2020; Lillard, 2021; Mavrič, 2020). This classification has important interpretive consequences, particularly within current literacy discourse shaped by the science of reading, where constructivist approaches are frequently contrasted with explicit, systematic instruction. As a result, Montessori education is sometimes assumed to prioritize discovery-based learning at the expense of structured teaching, despite a growing body of evidence to the contrary.

Powell's (2000) comparative analysis directly illuminates this tension, arguing that although Montessori classrooms and constructivist classrooms may appear similar at a surface level, they diverge in theoretically and pedagogically significant ways. Drawing on Piagetian theory, Powell (2000) explains that constructivist classrooms emphasize open-ended manipulation, peer interaction, and the transformation of action into understanding, often allowing errors to remain unresolved as part of exploration. In contrast, Montessori materials are intentionally designed to constrain error and guide the learner toward correct abstraction, providing a unique form of scaffolding through carefully sequenced, self-correcting tasks. This distinction challenges the assumption that Montessori education lacks structure or explicitness, revealing instead a system in which structure is embedded in materials, sequence, and teacher action rather than delivered through constant verbal instruction.

Control of Error, Explicit Structure, and Child Autonomy

Montessori's principle of control of error, a built-in means by which the child can check their work and become aware of mistakes independently rather than relying on adult correction, exemplifies this embedded structure but should be understood as part of a broader instructional system rather than an isolated feature. Montessori (1967a) emphasized that education must provide children with organized environments in which they can recognize and correct errors independently, allowing learning to proceed without constant external evaluation. Crucially, this autonomy does not replace explicit instruction; it depends upon it, as materials are introduced through precise demonstrations and arranged in carefully graduated sequences. Powell (2000) notes that this programmed progression differentiates Montessori materials from the open-ended manipulatives common in constructivist classrooms, where the absence of built-in constraints can obscure instructional goals.

Teacher Guidance and Structured Support

Another source of interpretive tension lies in misconceptions about the teacher's role. Montessori teachers are sometimes portrayed as passive observers, reinforcing the belief that instruction is implicit or incidental. However, historical and contemporary

scholarship emphasizes that Montessori teachers provide explicit, systematic support through modeling, sequencing, and correction when necessary (Joosten, 2016). Montessori (1967b) stressed the importance of precise language, controlled movements, and intentional lesson structure, particularly in literacy instruction. This level of instructional planning aligns more closely with explicit teaching models than with discovery-based constructivism, even though it is delivered through materials and environment rather than continuous verbal explanation.

Sources of Interpretive Tension

The tension, therefore, does not stem from incompatibility between Montessori practice and evidence-based literacy instruction, but from how Montessori's child-centered philosophy has been interpreted through a constructivist lens. When autonomy, self-correction, and hands-on learning are divorced from their grounding in sequence, structure, and teacher expertise, Montessori instruction may appear unstructured or non-explicit. Powell (2000) explains that Montessori classrooms differ from constructivist classrooms in that materials often include self-correcting features that guide children toward correct abstraction, individual work is emphasized over group projects, and teachers actively shape the classroom environment to support independent learning and moral development.

By examining how Montessori education is often misclassified as purely constructivist, the apparent paradox becomes clearer. This approach is marginalized not because it fails to align with evidence-based literacy principles, but because its approach to explicit, systematic, cumulative, and individualized instruction—embedded in materials, sequencing, multisensory engagement, and teacher-guided observation—operates in ways that contemporary research is only beginning to recognize as visionary. Understanding these distinctions clarifies how Montessori classrooms achieve evidence-based literacy outcomes while maintaining child-centered autonomy and developmentally responsive practice.

Empirical Evidence on Montessori Literacy Outcomes

Recent studies show that high-quality Montessori programs produce significant gains in early literacy, executive function, and oral language, with the greatest gains seen after multiyear participation (Brown et al., 2025; Lillard et al., 2025). Studies indicate that explicit, systematic, and multisensory Montessori instruction promotes equitable outcomes for diverse learners (Beach, 2026; Courtier et al., 2021; Randolph et al., 2023). Public Montessori programs may also deliver these benefits more efficiently than conventional preschool (Lillard et al., 2025).

National Randomized Controlled Trial

Seminal research has long suggested that quality preschool education can produce lasting positive effects, yet consensus on the comparative effectiveness of different preschool models remains limited (Lillard et al., 2025). A recent national randomized controlled trial examined the impact of enrollment at age 3 (PK3) in 24 oversubscribed public Montessori schools, using admission lotteries to assign participants (Lillard et al., 2025). Children who began at age 3 demonstrated significantly higher end of kindergarten outcomes in reading, working memory, executive function, and theory of mind, with effects ranging from 0.22 to 0.30 SD across all children offered enrollment, regardless of program retention. Interestingly, the study also included a cost analysis, revealing that three years of public Montessori programs were estimated to cost $13,127 less per child than traditional preschool programs, largely due to higher child-to-teacher ratios in PK3 and PK4. The authors caution, however, that variability in Montessori implementation, the limited representativeness of participants, and missing data may constrain generalizability beyond these public schools and kindergarten outcomes.

Large-Scale Analyses

In Arizona, large-scale analyses provide further evidence of Montessori instruction's impact on literacy. Brown et al. (2025) evaluated reading achievement in 26 public Montessori schools, analyzing standardized English language arts (ELA) scores from 4,781 students and comparing them to over 512,000 students statewide. Their investigation accounted for student demographics, full academic year enrollment, and program participation, revealing that Montessori students outperformed peers by a mean difference of 0.46 standard deviations. Gains were especially pronounced for children who attended Montessori school for three or more years, with students receiving special education services achieving parity with the general population after sustained exposure. Regression analyses suggested that these outcomes were positively associated with Montessori instruction itself, independent of socioeconomic status, English learner

designation, or demographic factors. Nevertheless, limitations included the lack of random assignment, absent baseline equivalency, unmeasured fidelity across schools, and pre-pandemic data collection. These findings indicate that multiyear engagement in Montessori programs can meaningfully enhance literacy outcomes and satisfy criteria for evidence-based practice in early education.

Teacher Perspectives on Fidelity

Teacher perspectives illuminate the fidelity and practical implementation of Montessori literacy instruction. A phenomenological study of seven Montessori teachers across Canada, Mexico, and Italy explored how educators implement early literacy practices (Beach, 2026). Teachers consistently emphasized oral language development, explicit and systematic instruction, and literacy-rich environments. These qualitative findings highlight the cross-cultural applicability of Montessori methods in fostering phonemic awareness, letter–sound knowledge, and, vocabulary. Although the study's small sample, reliance on single interviews, and absence of classroom observations limit causal inference and generalizability, it provides rich, nuanced detail often absent from experimental research, emphasizing the critical role of teacher fidelity and experience in producing positive literacy outcomes.

Meta-Analyses and Synthesis

Building on individual studies and regional analyses, large-scale syntheses provide a more comprehensive assessment of Montessori instruction's impact on literacy and related outcomes. Randolph et al. (2023) conducted a rigorous meta-analysis of 32 studies, representing over 132,000 data points and found that Montessori education produced consistently positive academic and nonacademic outcomes, with effect sizes of 0.17 for literacy, 0.22 for mathematics, 0.24 overall academic performance, and 0.33 for nonacademic outcomes such as executive function and well-being. Methodological strengths include the use of cluster-robust variance estimation, strict inclusion criteria requiring baseline equivalence, and examination of both public and private Montessori settings, providing high-level confidence in the observed effects. However, the analysis also revealed several limitations: variability in Montessori implementation, particularly in public schools, small sample sizes in many studies, potential publication bias favoring Montessori instruction, and a lack of longitudinal follow-up for many outcomes. These methodological considerations suggest that although the overall findings strongly support Montessori instruction's positive impact, future research should carefully account for implementation fidelity, expand sample sizes, and follow children over time to confirm the sustainability of both academic and nonacademic benefits.

Experimental Evidence in Adapted Montessori Programs

Complementing these findings, Courtier et al. (2021) conducted a preregistered, randomized controlled study in French public preschools, comparing an adapted Montessori curriculum to conventional classrooms for 176 kindergarten-aged children. The Montessori program, constrained by public-school requirements, featured fewer materials, shorter work periods, and teachers with limited Montessori training. Despite these adaptations, children in Montessori classrooms demonstrated significantly higher reading skills at the end of kindergarten ($d = 0.68$), with gains also reflected in subjective reading ($d = 0.71–0.93$). Notably, effects on math, executive function, working memory, or social skills were largely absent within the public-school sample, though private Montessori classrooms with higher fidelity exhibited broader academic advantages. Longitudinal analyses showed that the reading benefits only emerged by the end of kindergarten, highlighting that literacy gains may require sustained exposure. Limitations included the modest sample size for longitudinal tracking ($N = 70$), non-anonymized assessors, and the lower fidelity of Montessori program implementation in the public-school setting. Nevertheless, this study provides rigorous experimental evidence that even a moderately adapted Montessori program can significantly enhance early reading skills, particularly for children from disadvantaged backgrounds, without negatively affecting other learning domains. These findings align with prior U.S.-based research (Lillard & Else-Quest, 2006) and suggest the potential of Montessori literacy instruction to reduce early reading inequalities.

Conclusion

Montessori education uniquely bridges child-centered pedagogy and evidence-based literacy instruction. Across experimental, large-scale, longitudinal studies, Montessori classrooms consistently boost early literacy, language, executive function, and social-emotional skills—especially when implemented with multiyear, high-fidelity instruction. Critical analysis of

the literature highlights that these benefits depend on structured, sequential, multisensory methods; careful teacher preparation; and sustained program exposure. This synthesis suggests a new conclusion: Montessori education should be recognized not merely as child-centered or constructivist, but also as a rigorously structured approach capable of delivering systematic literacy outcomes aligned with contemporary science-of-reading principles. Based on these findings, educators and policymakers should prioritize Montessori training, ensure fidelity to its sequential materials and methods, and provide multiyear engagement to maximize literacy gains, particularly for diverse or at-risk learners. These recommendations translate research insights into actionable guidance for improving early literacy outcomes.

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