

Beyond Correct Letters: Cognitive Foundations of Spelling in Multilingual African Contexts

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Research Article

Keywords: spelling development, cognitive-linguistic processes, multilingualism, African languages, phonological awareness, morphological awareness

Posted Date: October 22nd, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-11296576/v1>

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Additional Declarations: No competing interests reported.

Abstract

Spelling is frequently characterised as the accurate reproduction of conventional written forms, a definition that can obscure the cognitive and linguistic mechanisms underpinning its acquisition and development. This conceptual article reframes spelling as an integrated cognitive–linguistic process and considers what this means for multilingual education in African contexts. Drawing on a qualitative, theory-driven synthesis of literacy studies, cognitive psychology, linguistics, and multilingual education, it combines research on phonological, orthographic, and morphological awareness with evidence on memory, vocabulary, and multilingual resources. The synthesis advances the position that spelling competence arises from dynamic interactions among these component systems rather than from a strictly linear process of grapheme sequencing. It also argues that multilingualism is not mainly a source of cross-linguistic interference; rather, it offers resources learners strategically draw on across languages to develop literacy. With specific attention to African educational contexts in which learners negotiate languages differing in orthographic depth, morphological structure, and instructional status, the article proposes a Multidimensional Cognitive–Linguistic Spelling Framework that embeds core cognitive processes within multilingual ecologies and schooling conditions. The proposed framework aims to guide empirically grounded spelling instruction and assessment by considering learners' linguistic repertoires and the cognitive processes underlying orthographic learning.

INTRODUCTION

Spelling represents a core component of literacy acquisition and constitutes a salient marker of academic performance within formal educational contexts. Learners are routinely assessed on their capacity to generate orthographically correct written forms, and spelling accuracy is frequently treated as an indicator of broader linguistic competence. Owing to its high visibility in written production, spelling occupies a central role in classroom-based evaluation and substantially shapes judgments regarding learner ability.

Notwithstanding its prominence, spelling is often conceptualised as a low-level skill involving the memorisation of orthographic forms and the reproduction of correct letter sequences, rather than as a cognitively complex dimension of literacy (Castles et al., 2022). In many instructional contexts, spelling practices continue to emphasise explicit rules, repetitive practice, and rote memorisation of decontextualised word lists. Although such approaches may support surface-level orthographic accuracy, they provide only a partial account of the cognitive and linguistic processes underlying spelling development.

Contemporary scholarship conceptualizes spelling as a multifaceted cognitive–linguistic competence that depends on the coordinated operation of phonological awareness, morphological knowledge, memory systems, lexical knowledge, and broader oral and written language proficiency (Rastle & Taylor, 2021). Accordingly, spelling is not merely the reproduction of letter sequences; rather, it entails the integration of phonological, orthographic, morphological, semantic, and lexical constraints during word

production. Phonological awareness underpins the identification and manipulation of sublexical sound structures, whereas morphological knowledge supports the analysis of meaning-bearing units (e.g., roots, prefixes, and suffixes) that influence word formation and regularities in spelling. Memory processes contribute by maintaining and operating on phoneme–grapheme correspondences and by consolidating stable orthographic representations in long-term memory (Ehri, 2020). In parallel, vocabulary breadth and general language knowledge strengthen lexical and semantic representations, thereby facilitating more appropriate orthographic selections and increasing spelling accuracy.

Taken together, these processes position spelling as a multidimensional cognitive activity rather than a mechanical reproduction of written forms. This perspective has important implications for instruction and assessment. Accuracy-based approaches generally evaluate whether learners' written forms correspond to expected orthographic targets, but may provide limited insight into the strategies and developing knowledge underlying particular spellings. Such approaches can consequently obscure partial, emergent, and developmentally meaningful forms of linguistic knowledge. Contemporary literacy research therefore calls for greater attention to the cognitive and developmental processes underlying literacy performance rather than to accuracy as an end in itself (Treiman & Kessler, 2021).

These concerns are particularly significant in multilingual African contexts, where learners routinely navigate and use multiple languages in their homes, communities, and educational environments. In many African classrooms, learners use African languages as dominant home or community languages while simultaneously engaging with additional languages such as English, which frequently functions as a primary language of learning and teaching (Phajane, 2021). Such multilingual environments provide learners with access to multiple linguistic resources during literacy-related activities, including spelling.

However, spelling instruction and assessment are commonly designed and implemented primarily in the official language of schooling, with limited recognition of the cognitive and linguistic contributions of learners' other languages. This can create a misalignment between learners' multilingual linguistic repertoires and the pedagogical and assessment practices used to develop and evaluate spelling competence.

Despite a substantial body of research on the cognitive foundations of spelling, much of this literature has been conducted in monolingual or English-dominant contexts (Share, 2021). Although these studies have yielded important evidence regarding the cognitive mechanisms underlying spelling acquisition, they do not fully explain how such mechanisms function when literacy is developed across languages that differ in phonological, morphological, lexical, and orthographic structure. This constraint is especially salient in multilingual African educational contexts, where learners may mobilize knowledge from multiple languages as they acquire literacy. Accordingly, recent work in multilingual literacy emphasizes the need to examine how learners' linguistic repertoires interact during literacy development, particularly in settings where English serves as the primary language of learning and teaching (Rastle & Taylor, 2021).

The purpose of this conceptual paper is therefore to interrogate the cognitive and linguistic foundations of spelling and to examine how these processes can be understood within multilingual African contexts. The paper responds to the need for a more integrated account of spelling that moves beyond narrow correctness-oriented conceptions and recognises the interaction of cognitive, linguistic, and multilingual resources.

Based on a qualitative, theory-driven review of literacy studies, cognitive psychology, and multilingual education, the paper synthesises major theories of spelling development. It introduces a Multidimensional Cognitive-Linguistic Spelling Framework that views spelling as an integrated cognitive process within multilingual African sociolinguistic contexts. The framework combines established cognitive dimensions with attention to multilingual repertoires and different orthographies, providing a foundation for more nuanced accounts of spelling development and for theory-informed literacy instruction, assessment, and learner support in multilingual settings.

LITERATURE REVIEW

Spelling as an Integrated Cognitive-Linguistic System

Recent scholarship increasingly conceptualises spelling as a multidimensional cognitive-linguistic process rather than a mechanical transcription activity. Evidence indicates that spelling depends on the coordinated interaction of phonological, orthographic, morphological, and semantic systems within broader memory networks (Castles, Rastle, & Nation, 2022). Spelling therefore involves more than reproducing letters; it requires learners to construct, consolidate, and retrieve stable orthographic representations through linguistic experience and cognitive processing.

Research further demonstrates that spelling development is associated with multiple interacting linguistic components rather than with the memorisation of isolated rules. Evidence from research on reading and writing development indicates that phonological awareness, morphological awareness, and vocabulary knowledge are significant predictors of spelling performance across developmental stages (Lee, Wolters, & Kim, 2023). These findings support a process-oriented understanding of spelling in which orthographic accuracy reflects the interaction of several cognitive and linguistic systems.

Phonological Awareness and Cross-Linguistic Spelling Development

Phonological awareness is widely recognized as a robust predictor of spelling acquisition in alphabetic orthographies. It denotes the capacity to detect, segment, and manipulate the phonological structure of spoken language, processes that facilitate the establishment of systematic phoneme–grapheme correspondences during spelling. In multilingual settings, phonological awareness may function across languages rather than being confined to a single linguistic system. Empirical research with multilingual learners provides evidence for cross-linguistic transfer in phonological processing, particularly between home languages and the language(s) of formal instruction (Zhou & McBride, 2023). These findings imply

that phonological representations and skills developed in one language can support literacy-related outcomes in another; however, the magnitude and direction of transfer are likely moderated by language-specific phonological properties and orthographic depth.

Evidence from African contexts provides further support for this relationship. Research in South Africa indicates that phonological awareness in indigenous languages contributes positively to English spelling performance and that phonological awareness is a significant predictor of spelling accuracy among isiXhosa-speaking learners (Daries, Bowles, & Schaefer, 2022). These findings position phonological awareness as an important foundation for spelling development while also demonstrating the relevance of cross-linguistic resources in multilingual literacy acquisition.

Morphological Awareness and Word Formation Processes

Morphological awareness is defined as learners' capacity to detect, analyse, and manipulate morphemic constituents of words (e.g., roots, prefixes, and suffixes). This metalinguistic skill is implicated in spelling acquisition insofar as it enables learners to represent orthographic forms by leveraging systematic structural relations among morphologically related lexical items. Evidence from experimental studies suggests that morphological awareness facilitates both spelling and reading development, with effects that are particularly pronounced under conditions of explicit instruction targeting morphological structures (Ardanouy, Zesiger & Delage, 2023).

Morphological awareness is particularly relevant to languages in which words contain complex combinations of meaningful units. In agglutinative African languages such as isiZulu and isiXhosa, word formation involves systematic combinations of morphemes, meaning that spelling cannot be adequately understood through sound–letter correspondences alone. Knowledge of morphological structure can therefore provide an additional basis for constructing and maintaining accurate orthographic representations. South African research further indicates that morphological and orthographic knowledge are important predictors of spelling performance among isiXhosa learners (Daries & Bowles, 2024). This highlights the importance of structural linguistic knowledge in spelling development, particularly in morphologically complex language systems.

Memory Systems, Orthographic Learning, and Lexical Development

Memory constitutes a central component in both the development and online execution of spelling. Working memory facilitates the transient maintenance, manipulation, and integration of phonological and orthographic information during spelling production, whereas long-term memory supports the consolidation of, and subsequent access to, stable, word-specific orthographic representations. Repeated exposure to written forms strengthens these representations, thereby progressively increasing the efficiency and automaticity of spelling during written composition. Lexical development is tightly coupled to this learning trajectory: as vocabulary knowledge expands, learners establish more

elaborated associations among word forms, meanings, and phonological structure, which in turn provides additional constraints that support the encoding, stabilization, and retrieval of orthographic representations (Castles et al., 2022; Lee et al., 2023). From this standpoint, spelling is best conceptualized as a component of an integrated lexical system in which phonological, orthographic, and semantic information interact dynamically, challenging approaches that construe spelling as an isolated skill dependent primarily on rote memorization.

Multilingual Spelling Development in African Educational Contexts

Multilingualism is increasingly recognised as an important dimension of literacy development rather than merely a contextual variable or potential source of interference. In many African educational settings, learners use multiple languages across home, community, and school environments, including African languages alongside languages of learning and teaching such as English. Research indicates that multilingual learners can draw on linguistic resources across languages during literacy-related activities, resulting in cross-linguistic interaction rather than simply unidirectional interference (Zhou & McBride, 2023).

Evidence from South Africa further suggests that literacy-related knowledge in indigenous languages can facilitate the development of English spelling, implying that learners may mobilize established cognitive and linguistic resources across distinct orthographic systems (Daries et al., 2022). The extent and form of such cross-linguistic transfer, however, are moderated by structural differences between the languages involved. For instance, relatively transparent orthographies such as isiXhosa exhibit more systematic phoneme–grapheme correspondences than English. In contrast, English orthography is comparatively opaque and typically necessitates greater reliance on lexical representations, morphological information, and memory-dependent processes. Consequently, multilingual learners are required to navigate differing orthographic constraints and may adapt their spelling strategies in accordance with the linguistic system in which writing occurs.

Notwithstanding these advances, cognitive models of spelling continue to be derived predominantly from monolingual and English-dominant cohorts. As a result, such accounts offer limited explanatory power regarding how multilingual African learners integrate and coordinate knowledge across multiple linguistic and orthographic systems over the course of spelling acquisition. In response, South African scholarship emphasises the need for theoretical and methodological approaches that construe multilingualism as a cognitive and linguistic resource, rather than framing it chiefly in terms of deficit or cross-linguistic interference (Daries & Bowles, 2024).

Synthesis and Conceptual Gap

The reviewed literature characterises spelling as a multidimensional cognitive–linguistic process emerging from the coordinated operation of phonological awareness, morphological awareness, orthographic knowledge, memory, and lexical knowledge. These component systems function

interdependently, and their relative contributions to spelling acquisition are modulated by developmental trajectories and language-specific properties. Two interrelated constraints in the extant scholarship are apparent. First, prominent cognitive accounts of spelling have largely been derived from monolingual or English-dominant samples, thereby limiting their generalisability to multilingual populations. Second, African linguistic contexts remain insufficiently incorporated into broader cognitive models of spelling, notwithstanding evidence that literacy development in these settings is shaped by interaction across multiple linguistic and orthographic systems. Accordingly, the primary limitation is not merely a scarcity of studies on spelling in African languages; rather, it is the absence of an integrative conceptual framework that links established cognitive models of spelling with the multilingual linguistic ecologies within which many African learners develop literacy. This paper addresses this need by reconceptualising spelling as an integrated cognitive process in which phonological, orthographic, morphological, lexical, and memory systems operate within multilingual environments. On this basis, it motivates the Multidimensional Cognitive-Linguistic Spelling Framework introduced in the subsequent sections.

METHODOLOGY

Research Design

This study adopts a qualitative, conceptually oriented research design located within a critical–interpretive paradigm. Rather than producing primary empirical data, it aims to construct a theoretically grounded account of spelling as a cognitive-linguistic process in multilingual African contexts. A conceptual approach is warranted because the study seeks to synthesise extant scholarship, interrogate the assumptions underpinning dominant models of spelling, and elaborate an integrative theoretical framework derived from the literature. Accordingly, published research is treated as the primary object of conceptual analysis, not as participant-generated empirical evidence. This design enables the systematic integration of perspectives from literacy studies, cognitive psychology, linguistics, and multilingual education, and facilitates an assessment of their applicability to multilingual African educational settings.

Data Sources and Selection Strategy

This study is based exclusively on peer-reviewed scholarly literature published between 2021 and 2026. Relevant sources were identified via scholarly search engines and academic databases, including Google Scholar and Scopus-indexed outlets, with an emphasis on work in literacy studies, language education, applied linguistics, and adjacent disciplines. A purposive sampling approach was employed to assemble literature aligned with the study’s conceptual aims. Inclusion criteria comprised: (i) direct relevance to spelling development, literacy acquisition, or cognitive dimensions of language processing; (ii) substantive treatment of phonological, orthographic, morphological, lexical, and/or memory-related components of spelling; (iii) applicability to multilingualism, African languages, and/or multilingual educational settings; (iv) publication within the 2021–2026 timeframe; and (v) peer-reviewed empirical or

theoretical contributions. Exclusion criteria encompassed studies confined to non-alphabetic writing systems or to literacy domains lacking a clear linkage to spelling development and the specific cognitive-linguistic constructs considered in this paper. The resulting selection was intended to yield a targeted corpus to support conceptual synthesis, rather than to function as a systematic review or an exhaustive bibliometric assessment.

Analytical Approach

The selected literature was examined using a combined conceptual synthesis and thematic analysis. An iterative process of close reading, constant comparison, and cross-study triangulation was employed to identify recurrent constructs, inter-construct relations, and underlying theoretical assumptions relevant to spelling development. The analysis was conducted across three interrelated levels. (1) Descriptive coding: systematic identification of central cognitive and linguistic constructs, including phonological awareness, orthographic knowledge, morphological awareness, memory, vocabulary, and multilingual linguistic resources. (2) Analytical clustering: organisation of conceptually related constructs into higher-order dimensions, namely cognitive processes, linguistic structures, lexical development, memory, and multilingual interaction. (3) Theoretical synthesis: evaluation of the functional relations among these dimensions and their integration into a unified account of spelling as a multidimensional cognitive-linguistic process. This analytic procedure facilitated movement beyond a skills-based treatment of cognitive components in isolation by explicitly examining their interdependence within multilingual linguistic and educational contexts. The resulting synthesis informed the development of the Multidimensional Cognitive-Linguistic Spelling Framework presented in Section 4.

Theoretical Orientation

The present analysis is grounded in a cognitive-linguistic framework that construes spelling as an emergent product of dynamic interactions among linguistic knowledge and domain-general cognitive mechanisms. In alignment with contemporary models of literacy acquisition, this framework acknowledges the contributions of phonological, orthographic, morphological, semantic, and lexical representations, as well as memory-related processes, to spelling development. The study additionally adopts a multilingual ecological perspective, conceptualising spelling development as situated within the specific linguistic ecologies in which learners acquire and deploy literacy. Within this view, learners' linguistic repertoires are not characterised exclusively as sources of cross-linguistic interference; rather, they are treated as resources that can facilitate and mediate literacy-related processing across languages. This orientation is particularly salient in many African educational settings, where learners routinely navigate multiple languages across home, community, and school domains.

Trustworthiness and Rigour

Several measures were used to strengthen the rigour and credibility of the conceptual analysis. These included the application of explicit literature-selection criteria, iterative reading and thematic refinement, comparison of perspectives across literacy studies, cognitive psychology, linguistics, and multilingual education, and reflexive interpretation of the literature.

Attention was given to identifying convergent and divergent positions across studies rather than treating individual findings as universally applicable. The synthesis was also guided by the distinction between established evidence and conceptual inference. Claims concerning multilingual African contexts were therefore considered in relation to the available literature, while propositions extending beyond the existing evidence were treated explicitly as theoretical contributions of the present paper.

Methodological Limitations

This conceptual study collects no primary classroom data, so its contribution is theoretical rather than empirical. Its analysis depends on the scope, quality, and contextual fit of the literature it synthesises. Although the review emphasises work from 2021–2026, cognitively oriented spelling research in African multilingual contexts is limited; therefore, some claims draw on international cognitive science and literacy scholarship, considered for relevance rather than treated as direct African evidence. The proposed framework is a provisional baseline that requires systematic empirical testing across African languages and orthographies, educational phases, and multilingual ecologies.

Ethical Considerations

This study did not involve human or animal participants and did not generate primary data through interviews, surveys, observations, or other forms of direct participant engagement. It is based exclusively on the analysis and synthesis of published scholarly literature. Consequently, ethical clearance for research involving human participants was not required. The study nevertheless adhered to principles of academic integrity through accurate representation of published scholarship, appropriate citation and attribution, and careful distinction between claims supported by existing literature and conceptual propositions developed through the present analysis. The study therefore conforms to the ethical expectations applicable to conceptual and secondary scholarship in education and literacy research.

CONCEPTUAL FRAMEWORK

Overview of the Framework

This article develops the Multidimensional Cognitive-Linguistic Spelling Framework (MCLSF), which defines spelling as an emergent product of dynamic interactions among cognitive and linguistic systems, rather than as an isolated procedural skill. Integrating cognitive models of literacy with theories of multilingual language development, the framework accounts for the processes by which learners construct, consolidate, access, and monitor orthographic representations (Perfetti & Stafura, 2022; Nation & Castles, 2023). The MCLSF comprises five interdependent cognitive-linguistic dimensions: (1) phonological processing, (2) orthographic knowledge, (3) morphological awareness, (4) lexical–semantic development, and (5) memory. These dimensions are hypothesised to operate in a mutually constraining manner and to be systematically shaped by learners’ language exposure, linguistic experiences, and multilingual repertoires. Accordingly, spelling development is situated at the interface

between intrapersonal cognitive mechanisms and the linguistic ecologies in which literacy is learned (Koda, 2022; Deacon et al., 2023).

Phonological Processing

Phonological processing denotes the capacity to perceive, analyse, and manipulate the sound structure of spoken language. It constitutes a critical substrate for spelling acquisition insofar as learners must map phonological units onto their corresponding graphemic representations (Ziegler & Goswami, 2023). Nevertheless, phonological processing alone is insufficient to explain variance in spelling accuracy. As learners are exposed to increasingly complex vocabulary and orthographic regularities and irregularities, successful spelling additionally draws on orthographic, morphological, lexical, and memory-related knowledge resources (Bowers & Cooke, 2022). Accordingly, within the MCLSF, phonological processing is construed as one interacting component within a broader integrated system, rather than as a standalone determinant of spelling development.

Orthographic Knowledge

Orthographic knowledge denotes learners' progressively refined mental representations of written word forms, encompassing graphemic patterning, positional constraints, and language-specific spelling conventions. This knowledge supports increasingly efficient recognition and production of familiar orthographic sequences. Orthographic representations are assumed to emerge via repeated exposure to print and the incremental internalisation of distributional regularities within a given writing system (Seidenberg, 2021; Castles, Rastle, & Nation, 2022). Within the MCLSF, orthographic knowledge is conceptualised as integrating phonological and morphological information with the conventional constraints of a specific orthography. Accordingly, its development is shaped by both language-level properties and learners' accumulated literacy experiences.

Morphological Awareness

Morphological awareness is defined as the capacity to detect, analyse, and manipulate meaningful sublexical units (morphemes), including roots, prefixes, and suffixes. This skill supports spelling development by enabling learners to represent morphological relatedness across lexical items and to preserve orthographic consistency across inflected and derived word forms. Empirical evidence suggests that morphological awareness is positively associated with both spelling performance and vocabulary growth, particularly when morphological structures are addressed through explicit instruction (Goodwin & Jiménez, 2023; Apel et al., 2022).

Morphological awareness is especially salient in languages characterised by high morphological complexity. In agglutinative African languages such as isiZulu and isiXhosa, lexical items may comprise

multiple concatenated morphemes whose ordering and composition systematically shape their written representations. Accordingly, models of spelling development in these languages are not adequately accounted for by phoneme–grapheme correspondences alone. Rather, spelling acquisition likely reflects the coordinated contribution of morphological and orthographic knowledge in the generation and interpretation of written forms (Dlamini & Zulu, 2024).

Lexical-Semantic Development

Vocabulary knowledge provides an important semantic and lexical foundation for spelling. Words that are well established within a learner's vocabulary are represented through interconnected information concerning their sounds, written forms, and meanings. Richer lexical representations can therefore support the encoding and retrieval of orthographic forms (Perfetti & Stafura, 2022; Ouellette & Shaw, 2023).

Within the MCLSF, lexical-semantic development functions as a connecting dimension between meaning and form. Vocabulary is therefore not treated as an independent background variable but as part of the representational system through which learners establish, retrieve, and consolidate spelling knowledge.

Memory Systems

Memory supports the encoding, consolidation, and retrieval of orthographic knowledge. Working memory enables learners to temporarily maintain and manipulate phonological and orthographic information during spelling, while long-term memory supports the retention and retrieval of established lexical and orthographic representations (Nation & Castles, 2023; Seidenberg, 2021).

Repeated encounters with written forms contribute to the strengthening and automatising of orthographic representations. As spelling becomes increasingly automatic, fewer cognitive resources are required for retrieving familiar forms, allowing greater attention to be directed towards higher-level writing processes. Within the MCLSF, memory therefore functions as an enabling mechanism that connects learning, consolidation, and subsequent retrieval.

Integration of Cognitive-Linguistic Systems

The central proposition of the MCLSF is that spelling cannot be adequately explained by any single cognitive or linguistic component. Phonological information contributes to the analysis of sound structure; orthographic knowledge provides knowledge of written patterns; morphological awareness supports the analysis of word structure; lexical-semantic knowledge connects form and meaning; and memory enables the consolidation and retrieval of these representations (Perfetti & Stafura, 2022; Koda, 2022). These dimensions are therefore conceptualised as an **interactive system**. Their relative contribution may vary according to the word being spelled, the learner's developmental level, the

linguistic context, and the characteristics of the writing system. The framework consequently moves beyond additive models in which individual skills are simply accumulated and instead emphasises their coordinated operation during spelling.

Multilingual Mediation of Spelling Processes

A distinctive feature of the MCLSF is its treatment of multilingualism as part of the cognitive-linguistic environment in which spelling develops. In multilingual African contexts, learners encounter and use multiple linguistic systems across home, community, and educational settings. Multilingual literacy perspectives suggest that learners may draw on resources across their linguistic repertoires rather than processing each language as an entirely isolated system (García & Wei, 2022; Vogel & García, 2023).

The framework identifies two related mechanisms. The first is cross-linguistic transfer, through which knowledge developed in one language may support literacy-related processing in another, including phonological and morphological knowledge (Zhou & McBride, 2023). The second is repertoire activation, through which learners may draw on knowledge from more than one language when interpreting or constructing unfamiliar linguistic forms (Koda, 2022).

The framework therefore does not assume that multilingual transfer is uniformly positive or negative. Instead, the direction and usefulness of cross-linguistic influence are understood as dependent on relationships among the languages, their writing systems, the learner's proficiency, and the particular literacy task.

Orthographic Contrast Sensitivity

Multilingual learners encounter differences in the ways languages represent spoken language in writing. These differences may involve the consistency of phoneme–grapheme relationships, permissible orthographic patterns, morphological representation, and the extent to which spelling depends on word-specific knowledge. Such variation can contribute to learners' developing awareness of differences between orthographic systems (Ziegler & Goswami, 2023).

The MCLSF therefore incorporates **orthographic contrast sensitivity** as a mediating dimension through which learners may recognise and respond to differences among the writing systems they encounter. In multilingual African contexts, relatively transparent orthographies such as isiXhosa may provide different processing demands from the comparatively opaque English orthography. Multilingualism is consequently conceptualised as a potential cognitive-linguistic resource that can expand learners' metalinguistic awareness, rather than being treated solely as a source of interference (García & Wei, 2022).

Visual Representation of the Framework

The Multidimensional Cognitive-Linguistic Spelling Framework (MCLSF) conceptualises spelling development as an emergent outcome of reciprocal interactions among multiple cognitive and linguistic systems. Rather than attributing spelling performance to a single skill, the framework proposes that phonological processing, orthographic knowledge, morphological awareness, lexical-semantic development, and memory operate as an integrated and mutually constraining network. These cognitive-linguistic dimensions are further embedded within a broader multilingual ecological context characterised by learners' linguistic repertoires, cross-linguistic transfer, orthographic contrast sensitivity, and educational language experiences. Figure 1 illustrates the proposed relationships among these components and highlights the central role of their dynamic interaction in shaping spelling performance.

Theoretical Contribution of the Framework

The MCLSF advances three core theoretical contributions. First, it reconceptualises spelling as an integrated cognitive–linguistic system, rather than as a primarily mechanical or procedural skill (Nation & Castles, 2023). Second, it extends cognitive models of spelling by explicitly embedding cognitive processes within multilingual African linguistic ecologies, thereby addressing limitations associated with predominantly monolingual accounts (Koda, 2022). Third, it positions multilingualism as a potential cognitive–linguistic resource that may mediate spelling development via cross-linguistic knowledge transfer, activation of learners' linguistic repertoires, and heightened sensitivity to orthographic variation (García & Wei, 2022). Collectively, the framework provides a conceptual linkage between established cognitive theories of spelling and the multilingual contexts in which many African learners develop literacy.

CONCEPTUAL SYNTHESIS

This section presents the principal conceptual propositions emerging from the synthesis of recent scholarship. Because the study does not involve primary empirical data, these propositions are not reported as empirical findings. Rather, they represent theoretically derived conclusions from the integration of cognitive, linguistic, and multilingual perspectives on spelling development (Koda, 2022; Nation & Castles, 2023).

Spelling Operates as an Integrated Cognitive-Linguistic System

The synthesis indicates that spelling is best understood as an integrated cognitive-linguistic system rather than as a discrete mechanical skill. Phonological processing, orthographic knowledge, morphological awareness, lexical-semantic knowledge, and memory contribute collectively to spelling performance (Perfetti & Stafura, 2022; Deacon et al., 2023). Spelling accuracy consequently reflects the

coordination of multiple forms of knowledge rather than mastery of an isolated spelling skill (Castles, Rastle, & Nation, 2022; Lee, Wolters, & Kim, 2023).

Spelling Development Is Dynamic and Context-Dependent

The synthesis further suggests that the relative contribution of distinct cognitive-linguistic processes varies as a function of developmental stage, linguistic context, task demands, and properties of the writing system. Phonological processing appears to be especially salient in the early phases of spelling acquisition, whereas orthographic, morphological, lexical, and memory-related knowledge assume increasing importance as learners are exposed to more complex written forms (Bowers & Cooke, 2022; Nation & Castles, 2023). Importantly, these processes are not assumed to operate in a strictly sequential or substitutive manner; instead, they function as concurrently available, interacting resources whose relative weighting may shift across contexts (Kuperman et al., 2024; Zhou & McBride, 2023).

Morphological Awareness Provides Structural Support

The synthesis identifies morphological awareness as a substantive source of structural support for the development of spelling proficiency. Sensitivity to morphemic relationships may enable learners to detect regularities across morphologically related word forms and thereby attenuate an exclusive dependence on phonological approximation (Apel et al., 2022; Goodwin & Jiménez, 2023). This claim is particularly salient in morphologically complex languages, in which the structuring of meaningful units contributes markedly to processes of word formation and to orthographic representation (Dlamini & Zulu, 2024).

Multilingualism Mediates Spelling Development

Multilingualism constitutes a significant dimension of spelling development insofar as learners can mobilize knowledge across their linguistic repertoires. The synthesis delineates three interrelated mechanisms—phonological transfer, morphological resource deployment, and awareness of orthographic contrasts—through which competencies acquired in one language may contribute to literacy-related processing in another. However, the magnitude and directionality of such cross-linguistic influences are contingent on typological relationships among the languages involved and on specific task demands (Zhou & McBride, 2023; Vogel & García, 2023). Conceptually, these findings indicate that multilingualism should not be construed primarily as a source of interference; rather, multilingual learners can be characterized as operating within an expanded cognitive–linguistic repertoire that affords additional resources for analyzing and resolving spelling-related problems (García & Wei, 2022; Koda, 2022).

Memory Supports Orthographic Consolidation and Fluency

The synthesis suggests that memory processes are fundamental to the acquisition of proficient spelling. Working memory facilitates the transient maintenance, manipulation, and coordination of information during spelling production, whereas long-term memory underpins the consolidation and subsequent retrieval of stable orthographic representations (Seidenberg, 2021; Nation & Castles, 2023). Repeated exposure to printed word forms is posited to strengthen these representations and promote their automatisisation. Lexical knowledge, particularly vocabulary breadth and depth, may further support spelling development by providing semantic associations that enhance lexical encoding and retrieval processes (Ouellette & Shaw, 2023; Perfetti & Stafura, 2022).

Cognitive Spelling Processes and Classroom Assessment Are Not Always Aligned

An additional conceptual proposition pertains to the relationship between the cognitive foundations of spelling and its assessment. While cognitive models characterise spelling as an integrated, developmental, and strategy-mediated process, classroom assessment practices frequently operationalise performance as dichotomous judgments of correctness versus error. Such approaches may yield limited diagnostic evidence regarding learners' partial and emerging orthographic knowledge, evolving procedural strategies, and the underlying linguistic resources that motivate specific spelling productions (Broadfoot & Timmis, 2022; Wiliam, 2023). In multilingual contexts, this constraint may be amplified, insofar as assessments administered in a single language can mask the cross-linguistic resources learners recruit during literacy development. Consequently, assessment frameworks that attend to processes as well as outcomes may generate more informative accounts of spelling development than accuracy-based scores alone.

Consolidated Conceptual Proposition

Collectively, this synthesis substantiates the central claim of the MCLSF: spelling constitutes a multidimensional cognitive–linguistic process embedded in multilingual ecologies. Spelling acquisition reflects dynamic interactions among phonological, orthographic, morphological, lexical–semantic, and memory-related systems, the functioning of which is systematically modulated by individuals' linguistic experience and by cross-orthographic variation (Perfetti & Stafura, 2022; Deacon et al., 2023). Within multilingual African settings, spelling development should therefore be conceptualized not only with respect to the cognitive demands imposed by a given writing system, but also with respect to learners' heterogeneous linguistic repertoires and the language configurations of their instructional contexts (Koda, 2022; Vogel & García, 2023). Accordingly, the MCLSF offers a theoretical framework for reconceptualizing spelling instruction and assessment beyond surface-level accuracy, foregrounding instead the cognitive and multilingual resources that underpin orthographic learning and development.

DISCUSSION

Repositioning Spelling as a Cognitive–Linguistic Construct

This conceptual synthesis challenges accounts that construe spelling primarily as the reproduction of correct orthographic forms. Instead, the MCLSF conceptualises spelling as a multidimensional cognitive–linguistic process arising from the coordinated interaction of phonological, orthographic, morphological, lexical–semantic, and memory systems. This position aligns with contemporary literacy scholarship, which increasingly characterises written language development as emergent from the dynamic interplay of multiple linguistic and cognitive processes rather than from the incremental acquisition of discrete skills (Nation & Castles, 2023; Perfetti & Stafura, 2022). A key theoretical implication of this reconceptualisation is that spelling accuracy should not be interpreted exclusively as an outcome of rote memorisation of correct forms. Rather, spelling performance constitutes an observable index of the development and integration of underlying linguistic representations. Within this framework, spelling errors are likewise informative, as they can provide diagnostic evidence of learners’ evolving knowledge. Accordingly, pedagogical emphasis can shift from the correction of surface-level inaccuracies to the systematic analysis of the processes that generated them and the use of this information to support further development.

Spelling Development as Dynamic and Context-Dependent

The framework further posits that spelling acquisition should not be conceptualized as a uniform, linear progression through a fixed sequence of stages. Instead, the relative contribution of distinct cognitive-linguistic resources is expected to vary as a function of learners’ developmental status, properties of the target language, task demands, and prior language experience. Empirical evidence likewise documents systematic variability in spelling strategies across orthographies and learner profiles (Bowers & Cooke, 2022; Kuperman et al., 2024). These findings carry direct implications for instructional sequencing. Specifically, rather than treating phonological, orthographic, morphological, and lexical knowledge as discrete and non-overlapping phases, instructional design can support their concurrent and iterative development. This integrative approach is especially pertinent for multilingual learners, whose spelling development is shaped by cross-linguistic transfer and the need to navigate linguistic systems with divergent structural and orthographic properties (Zhou & McBride, 2023).

Morphology as a Site of Instructional Leverage

The proposed framework conceptualises morphological awareness as a key instructional leverage point, particularly in languages characterised by morphologically complex word formation. Sensitivity to morphemic structure and relationships among derived or inflected forms may support learners’ detection of regularities across lexical families and contribute to the development of more robust orthographic representations (Goodwin & Jiménez, 2023; Apel et al., 2022). This issue is especially salient for African languages such as isiXhosa and isiZulu, in which word formation is governed by systematic and productive morphological processes. Accordingly, instruction that explicitly directs learners’ attention to roots, affixes, and the formal–semantic relations among morphologically related words can complement phonological and orthographic components of literacy instruction. On this account, morphology should not be positioned as an ancillary or optional extension of spelling

instruction; rather, it constitutes a core linguistic resource through which learners can develop more systematic and generalisable knowledge of written word forms.

Multilingualism as a Cognitive-Linguistic Resource

A central theoretical implication of the MCLSF is its conceptualisation of multilingualism as an integral component of the cognitive–linguistic ecology underpinning spelling development. Rather than construing learners’ additional languages primarily as sources of negative transfer, the framework posits that learners can strategically recruit knowledge from across their linguistic repertoires during literacy-related tasks. This orientation aligns with multilingual literacy research emphasising the purposeful deployment of cross-linguistic resources in meaning-making and print-based activity (García & Wei, 2022; Vogel & García, 2023). In many African educational settings, this perspective entails substantive pedagogical consequences. When learners’ home languages are systematically marginalised in spelling and literacy instruction, the scope for linking established linguistic knowledge to emerging orthographic representations may be constrained. By contrast, well-designed multilingual pedagogies can enable learners to undertake structured comparisons of phonological correspondences, morphological patterning, semantic relations, and orthographic regularities across languages. Such approaches do not assume that cross-linguistic transfer is uniformly facilitative; instead, they treat learners’ multilingual repertoires as empirically accessible resources that can be explicitly analysed and productively mobilised in the service of literacy learning.

Rethinking Memory and Vocabulary in Spelling Instruction

The proposed framework further delineates the interrelations among memory systems, vocabulary knowledge, and orthographic learning. Working memory is implicated in the temporary maintenance and manipulation of information required during spelling, whereas long-term memory supports the consolidation, storage, and subsequent retrieval of stabilized orthographic representations (Seidenberg, 2021). Vocabulary knowledge contributes to orthographic learning by linking word forms to semantic and other lexical representations, thereby reinforcing the broader representational network within which spelling competence emerges (Ouellette & Shaw, 2023). These relations imply that spelling instruction should be integrated with, rather than separated from, wider language development. In particular, systematic opportunities to encounter, discuss, read, and produce words in meaningful communicative contexts may promote the coordinated growth of lexical, semantic, and orthographic knowledge. In multilingual educational contexts, explicit support for vocabulary development across learners’ full linguistic repertoires may further strengthen cross-linguistic and within-language connections that facilitate the comprehension and retention of newly learned written forms.

Aligning Assessment with the Cognitive Nature of Spelling

A substantive implication of the proposed framework concerns the interface between spelling cognition and assessment practices. Conventional approaches to spelling assessment typically prioritise the final orthographic product and dichotomise responses as correct or incorrect. While accuracy is a central

indicator of spelling proficiency, an accuracy-only paradigm yields limited insight into the cognitive operations and knowledge representations that generate a learner's response. Assessment scholarship likewise documents constraints associated with predominantly product-oriented evaluations of learning (Broadfoot & Timmis, 2022; Wiliam, 2023). A process-sensitive assessment approach could therefore complement accuracy indices by systematically interrogating patterns across learners' spelling productions. Specifically, analyses of phonologically plausible approximations, morphological substitutions, sensitivity to orthographic regularities, and recurrent error profiles can furnish evidence of learners' developing linguistic knowledge. In multilingual African classroom contexts, such assessment should additionally attend to the linguistic repertoires learners mobilise during spelling tasks, including cross-linguistic resources. Conceptualised in this way, assessment operates not merely as a tool for adjudicating correctness but as a diagnostic mechanism for characterising, monitoring, and supporting spelling development.

Theoretical Contribution of the Study

The MCLSF makes three interconnected theoretical contributions. First, it brings phonological processing, orthographic knowledge, morphological awareness, lexical-semantic development, and memory together within a single account of spelling rather than treating them as independent predictors. Second, it extends cognitive accounts of spelling by situating these processes within multilingual African linguistic and educational environments, addressing the limitations of predominantly monolingual models (Koda, 2022). Third, it positions multilingualism as a potentially constitutive dimension of spelling development rather than as an external contextual variable.

The framework thus functions as a conceptual interface between cognitive models of spelling and the multilingual linguistic ecologies within which many African learners develop literacy. Its contribution is not to supplant established cognitive accounts, but to elaborate them by treating linguistic heterogeneity and cross-linguistic experience as constitutive components of explanations of spelling development. Collectively, the discussion motivates a reconceptualisation of spelling from a largely procedural emphasis on orthographic accuracy to a view of spelling as a cognitively integrated and linguistically situated activity. This reconceptualisation has implications for the theorisation, pedagogy, and assessment of spelling. In multilingual African educational settings, it necessitates approaches that explicitly attend to interactions among cognitive mechanisms, language-specific structural properties, and learners' multilingual repertoires. The MCLSF offers a conceptual foundation for such approaches while delineating domains that require further empirical validation and investigation.

Declarations

Author Contribution

The author was solely responsible for the conceptualisation, methodology, literature review, analysis, interpretation of findings, writing, revision, and final approval of the manuscript.

Acknowledgement

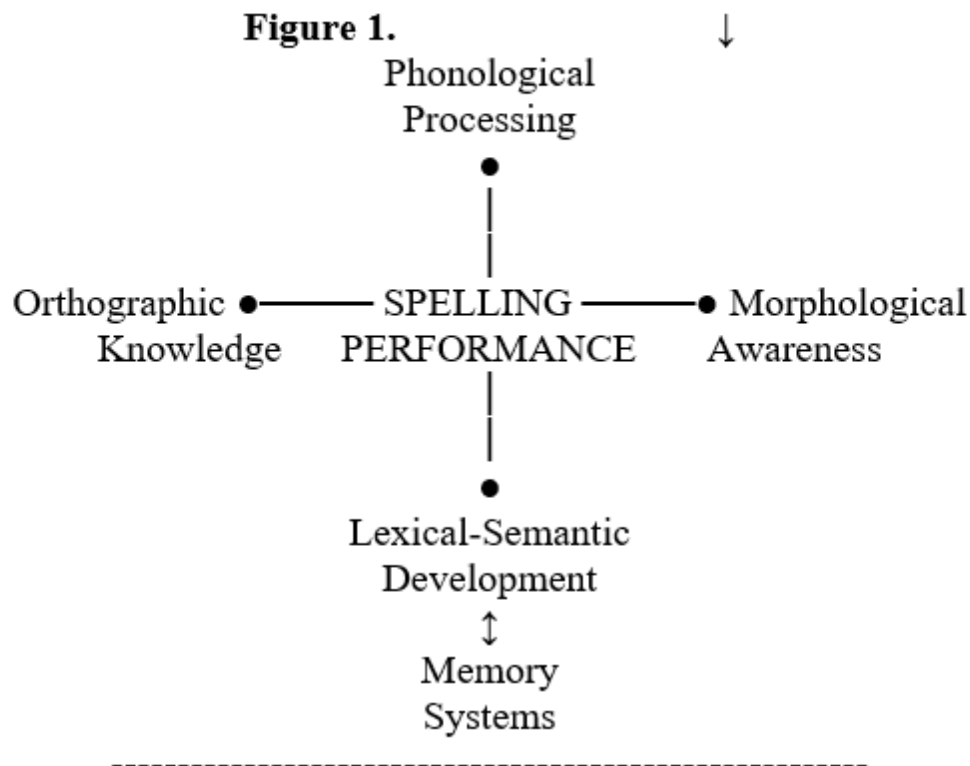
No specific individuals or institutions beyond the author(s) contributed to the development of this article in a way that warrants acknowledgement.

References

1. Apel, K., Diehm, E., & Apel, L. (2022). Morphological awareness intervention and literacy outcomes: Recent developments in spelling and word learning. *Language Speech and Hearing Services in Schools*, 53(3), 734–748.
2. Ardanouy, V., Zesiger, P., & Delage, H. (2023). Morphological awareness and spelling development: The contribution of derivational morphology to literacy acquisition. *Journal of Research in Reading*, 46(3), 315–332.
3. Bowers, P. N., & Cooke, G. (2022). Morphological instruction and literacy development: Contemporary perspectives on word structure and learning. *Reading Research Quarterly*, 57(4), 1125–1142.
4. Broadfoot, P., & Timmis, S. (2022). *Assessment and learning: Contemporary perspectives*. Routledge.
5. Castles, A., Rastle, K., & Nation, K. (2022). Ending the reading wars: Reading acquisition from novice to expert. *Psychological Science in the Public Interest*, 23(1), 5–51.
<https://doi.org/10.1177/15291006221113084>
6. Daries, V., & Bowles, H. (2024). Morphological and orthographic predictors of spelling development among isiXhosa-speaking learners. *Reading & Writing*, 15(1), 1–15.
7. Daries, V., Bowles, H., & Schaefer, M. (2022). Phonological awareness and spelling development among isiXhosa-speaking learners in South Africa. *Reading & Writing*, 13(1), 1–14.
8. Deacon, S. H., Tong, X., & Francis, K. (2023). Cognitive and linguistic foundations of literacy development in multilingual learners. *Reading and Writing*, 36(5), 1123–1147.
9. Dlamini, S., & Zulu, N. (2024). Morphological awareness and spelling development in Nguni-language literacy contexts. *Reading & Writing*, 15(1), 1–12.
10. Ehri, L. C. (2020). The science of learning to read words: A case for systematic phonics instruction. *Reading Research Quarterly*, 55(S1), S45–S60. <https://doi.org/10.1002/rrq.334>
11. García, O., & Wei, L. (2022). *Translanguaging: Language, bilingualism and education* (2nd ed.). Palgrave Macmillan.
12. Goodwin, A. P., & Jiménez, R. T. (2023). Morphological knowledge and literacy development: Emerging directions for research and practice. *Reading Research Quarterly*, 58(2), 215–232.
13. Koda, K. (2022). *Cross-language transfer and multilingual literacy development*. Routledge.
14. Kuperman, V., Siegelman, N., Schroeder, S., & Acartürk, C. (2024). Multilingual literacy development and lexical processing across orthographies. *Journal of Research in Reading*, 47(1), 1–18.

15. Lee, Y., Wolters, A. P., & Kim, Y. S. G. (2023). Relations of morphological awareness to literacy outcomes: A meta-analysis. *Review of Educational Research*, 93(4), 487–529.
16. Nation, K., & Castles, A. (2023). Cognitive foundations of literacy acquisition and development. *Annual Review of Developmental Psychology*, 5, 127–149.
17. Ouellette, G., & Shaw, J. (2023). Vocabulary depth, lexical quality, and literacy development: Implications for spelling and reading. *Scientific Studies of Reading*, 27(4), 301–318.
18. Perfetti, C. A., & Stafura, J. Z. (2022). Word knowledge and literacy acquisition: Contemporary perspectives on lexical quality. *Scientific Studies of Reading*, 26(5), 353–369.
19. Phajane, M. H. (2021). Multilingualism and literacy development in South African classrooms: Challenges and opportunities. *South African Journal of Childhood Education*, 11(1), 1–10.
20. Rastle, K., & Taylor, J. S. H. (2021). Print–speech convergence and the role of phonological processing in literacy acquisition. *Nature Reviews Psychology*, 1(1), 44–55.
21. Seidenberg, M. S. (2021). *Language at the speed of sight: How we read, why so many cannot, and what can be done about it*. Updated edn. New York: Basic Books.
22. Share, D. L. (2021). Literacy and reading acquisition in the twenty-first century: Theoretical perspectives and future directions. *Scientific Studies of Reading*, 25(4), 289–305.
23. Treiman, R., & Kessler, B. (2021). Learning to read and spell: Understanding the development of literacy skills. *Annual Review of Developmental Psychology*, 3, 165–187.
24. Vogel, S., & García, O. (2023). Translanguaging, literacy, and multilingual meaning-making in education. *International Journal of Multilingualism*, 20(3), 421–438.
25. Wiliam, D. (2023). *Assessment for learning: Meeting the challenge of implementation*. Solution Tree Press.
26. Ziegler, J. C., & Goswami, U. (2023). Phonological processing and literacy acquisition across orthographies: Contemporary perspectives. *Current Directions in Psychological Science*, 32(2), 97–103.
27. Zhou, Y., & McBride, C. (2023). Cross-linguistic transfer in literacy development among multilingual learners: A review of recent evidence. *Journal of Research in Reading*, 46(2), 155–174.

Figures



Source-author

Figure 1

The proposed relationships among these components and highlights the central role of their dynamic interaction in shaping spelling performance.