

**DEVELOPMENT OF WRITING BEYOND BLOCK LETTERS:
LINGUISTIC AND NEUROCOGNITIVE EVIDENCE****DESENVOLVIMENTO DA ESCRITA ALÉM DA LETRA BASTÃO:
EVIDÊNCIAS LINGÜÍSTICAS E NEUROCOGNITIVAS****DESARROLLO DE LA ESCRITURA MÁS ALLÁ DE LAS LETRAS
MAYÚSCULAS: EVIDENCIA LINGÜÍSTICA Y
NEUROCOGNITIVA**Marcello Marcelino¹**ABSTRACT**

This study examines literacy development in a bilingual educational context from a linguistic and neurocognitive perspective, questioning the predominance of block letters in early literacy instruction in Brazil. Drawing on research in language acquisition, biliteracy, and the cognitive science of reading, the article argues that restricting early writing instruction to a single script impoverishes graphic input and may delay the consolidation of reading and writing. The discussion is supported by a longitudinal observational study conducted in an international bilingual school in São Paulo, based on the analysis of approximately 1,500 student writing samples collected in 2019 and 2024. The results reveal a clear contrast between cohorts: students initially taught exclusively through block letters showed persistent graphic instability in later grades, whereas students exposed from the outset to multiple scripts (block letters, print script, and cursive handwriting) demonstrated earlier consolidation of writing and greater graphic consistency. The findings suggest that early and integrated exposure to multiple scripts can support the efficient development of literacy by aligning pedagogical practices with the cognitive mechanisms underlying reading acquisition. The study concludes by discussing implications for literacy instruction in both bilingual and monolingual educational contexts.

Keywords: Literacy acquisition; biliteracy development; handwriting instruction; block letters; cognitive science of reading.

RESUMO

Este estudo examina o desenvolvimento da escrita em um contexto educacional bilíngue a partir de uma perspectiva linguística e neurocognitiva, questionando a predominância da letra bastão nos primeiros anos da alfabetização no Brasil. Com base em pesquisas sobre aquisição da linguagem, biliteracia e ciência cognitiva da leitura, o artigo argumenta que a restrição do ensino inicial da escrita a um único script empobrece o *input* gráfico e pode retardar a consolidação da leitura e da escrita. A discussão é sustentada por um estudo observacional longitudinal realizado em uma escola bilíngue internacional em São Paulo, com base na análise de aproximadamente 1.500 produções

¹ Doutor, <https://orcid.org/0000-0003-4205-486X>, Universidade Federal de São Paulo (UNIFESP), marcello.unifesp@gmail.com

escritas de alunos, coletadas em 2019 e 2024. Os resultados revelam um contraste claro entre os grupos analisados: estudantes inicialmente alfabetizados exclusivamente com letra bastão apresentaram instabilidade gráfica persistente em anos posteriores, enquanto estudantes expostos desde o início a múltiplos *scripts* (bastão, *print* e cursiva) demonstraram consolidação mais precoce da escrita e maior consistência gráfica. Os achados sugerem que a exposição precoce e integrada a múltiplos *scripts* pode favorecer o desenvolvimento eficiente da alfabetização ao alinhar práticas pedagógicas aos mecanismos cognitivos subjacentes à aquisição da leitura. O estudo conclui com uma discussão das implicações para o ensino da alfabetização em contextos educacionais bilíngues e monolíngues.

Palavras-chave: Literacy acquisition; biliteracy development; handwriting instruction; block letters; cognitive science of reading.

RESUMEN

Este estudio examina el desarrollo de la escritura en un contexto educativo bilingüe desde una perspectiva lingüística y neurocognitiva, cuestionando el predominio de las letras de imprenta en los primeros años de alfabetización en Brasil. Basado en investigaciones sobre adquisición del lenguaje, bilingüismo y la ciencia cognitiva de la lectura, el artículo argumenta que restringir la instrucción inicial de la escritura a un solo sistema de escritura empobrece el input gráfico y puede retrasar la consolidación de la lectura y la escritura. El análisis se sustenta en un estudio observacional longitudinal realizado en una escuela bilingüe internacional en São Paulo, basado en el análisis de aproximadamente 1500 producciones escritas de estudiantes, recopiladas entre 2019 y 2024. Los resultados revelan un claro contraste entre los grupos analizados: los estudiantes que inicialmente alfabetizados exclusivamente con letras de imprenta mostraron una persistente inestabilidad gráfica en años posteriores, mientras que los estudiantes expuestos desde el principio a múltiples sistemas de escritura (de imprenta, de imprenta y cursiva) demostraron una consolidación más temprana de la escritura y una mayor consistencia gráfica. Los hallazgos sugieren que la exposición temprana e integrada a múltiples sistemas de escritura puede promover un desarrollo eficiente de la alfabetización al alinear las prácticas pedagógicas con los mecanismos cognitivos subyacentes a la adquisición de la lectura. El estudio concluye con una discusión sobre las implicaciones para la enseñanza de la lectoescritura en contextos educativos bilingües y monolingües.

Palabras clave: Adquisición de la lectoescritura; desarrollo de la lectoescritura bilingüe; enseñanza de la escritura a mano; letras mayúsculas; ciencia cognitiva de la lectura

INTRODUCTION

This article proposes a reflection on the process of writing acquisition from a linguistic perspective, with emphasis on the connections between language acquisition, literacy acquisition, and biliteracy. Language acquisition is, as Chomsky (1981, 1986, 1995) has already noted, a natural process. However, even after the child has consolidated the syntax of their language around the age of five, this development continues to be

influenced by schooling. The entry into reading and writing inaugurates a new stage of input, now formal and written, which begins to interact with the already established linguistic system, refining and expanding it in different directions. In Chomskyan terms, this continuity may be interpreted as the construction of the left periphery (CHOMSKY, 1981), activated and enriched through systematic exposure to written language. This perspective aligns with Kato (2005), who demonstrates that schooling expands the speaker's grammatical repertoire, configuring what she calls a “grammar of the literate,” which reorganizes the linguistic system by incorporating formal registers and new patterns of use. In a complementary way, Roeper (1999) proposes that every speaker can be viewed as bilingual between their nuclear grammar and the expansions generated through contact with other systems, including writing, which reinforces the idea that schooling inaugurates a second moment of linguistic development, marked by new layers of representation and interpretation.

It is important to clarify from the outset that, in this article, I use the term “literacy acquisition”. I am aware of the conceptual distinctions between literacy acquisition, literacy practices, literacy, biliteracy, and *biletramento*, widely discussed in recent literature (cf. FINGER; BRENTANO; ALVES, 2025). However, I choose the term “literacy acquisition” because the focus here is on the more technical and mechanical aspects of the process: how different scripts (block letters, print script, and cursive handwriting) are introduced and integrated. The discussion, therefore, focuses directly on the learning of the graphic system rather than on broader social practices of reading and writing².

From this perspective, written language should be understood not merely as a secondary code, but as an essential means of expanding linguistic input and, consequently, the grammatical and discursive repertoire of the learner. Early and systematic access to writing introduces new forms of syntactic, lexical, and textual organization that interact with the grammar already acquired and project it toward more complex levels of use. For this reason, it is fundamental that the teaching of reading and writing be conducted in an effective and consistent manner that aligns with the processes through which speakers learn

² For a detailed discussion of the different terminological frameworks, I refer the reader to Finger, Brentano, and Alves (2025).

their language, avoiding artificial ruptures between speech and writing, or between different scripts (graphic forms). By recognizing writing as a constitutive part of linguistic development, we reaffirm the need for evidence-based pedagogical practices that promote full and integrated contact with the diversity of graphic registers from the earliest years of schooling.

In the same line, it is important to emphasize that schooling does not limit itself to expanding syntactic mastery. As Roeper (1999) and Kato (2005) argue, schooling operates across different dimensions of language, since the child begins to receive massive, highly structured input when reading and writing processes begin. This contact becomes a new trigger for linguistic development, whose effects may be singular and almost individual, but which tend to converge in the formation of a socially recognized language within the linguistic community to which the learner belongs. As Marcelino (2017, p. 45) observes:

In general, the speaker's I-language does not purely reflect either the nuclear grammar or the marked periphery, but rather results from the interaction between the two, in relation to the cognitive system, and commonly converges in the judgments of speakers with equivalent levels of schooling and dialect.

The learning of writing, however, cannot be equated with the acquisition of spoken language. Whereas oral language emerges spontaneously under appropriate conditions, literacy acquisition is a non-natural process that requires intervention, planning, and explicit support. In this sense, the contribution of neuroscientific studies, such as those of Dehaene (2009, 2020), is decisive: understanding how the brain learns and organizes the circuits involved in reading and writing should guide any discussion about teaching. It is not possible to propose literacy practices without considering the learner's neurocognitive functioning.

Despite this, in Brazil, literacy acquisition is often treated primarily as a pedagogical issue, frequently detached from linguistic and cognitive foundations. In this article, I propose a shift in perspective: understanding literacy acquisition in light of language acquisition and brain functioning, particularly in the context of international bilingual education. In this scenario, the exclusive use of block letters is a critical point. I argue that this option, widely naturalized in pedagogical practice, warrants re-evaluation

in light of the available linguistic and neurocognitive evidence. It is a pedagogical convention that has historically been disseminated, yet lacks solid empirical support, especially in bilingual contexts, where children must articulate different graphic systems from the earliest years.

The article is organized as follows: after this introduction, I present the bilingual context of the research, describe the observational study conducted, discuss the results, and finally present the concluding remarks.

1. THE BILINGUAL CONTEXT OF THE RESEARCH

Literacy acquisition in bilingual contexts requires pedagogical approaches grounded in scientific evidence, particularly in international schools that integrate materials in English and Portuguese, which imposes on educational practices the need to consider what is carried out specifically in Portuguese. In Brazil, the practice of initiating literacy acquisition exclusively with block letters remains almost unquestioned. Although this choice has been naturalized as “facilitating” the initial stages of the process, there is, to date, no robust empirical evidence supporting its exclusivity as an initial pedagogical strategy. Nor is the notion that it is “facilitating” substantiated, since it finds no support in studies on how the brain learns.

Research in neuroscience (DEHAENE, 2009, 2020), cognitive psychology (EHRI, 2005; BERNINGER; WOLF, 2009), and bilingual education (CUMMINS, 2001; BIALYSTOK, 2001, 2002) demonstrates the benefits of early exposure to multiple graphic systems. This article, therefore, proposes a critical discussion of the hegemony of block letters, understood here as an impoverished stimulus for learners, and offers pedagogical alternatives that favor the acquisition of biliteracy in bilingual schools in Brazil.

1.1 The Tradition of Block Letters in Brazil

The predominant use of block letters does not derive from a unified pedagogical theory, but rather from practical conventions associated with the geometric simplicity of this graphic form (SOARES, 2004). School texts, teaching materials, and even official

documents such as the BNCC (2017) have indirectly reinforced this practice, without offering robust scientific justification. There is no evidence that the geometric simplicity of these forms, by itself, favors or stimulates the initial development of writing more effectively. As a result, young learners often first learn *what writing is not* (block letters everywhere) and only later, when writing is expected to be more consolidated, learn *what writing is* (lowercase letters, typographic variation, and cursive handwriting).

Researchers such as Ferreiro and Teberosky (1985) emphasized the constructivist nature of writing acquisition, but did not prescribe block letters as a mandatory stage. Thus, their hegemony consolidated itself as a pedagogical habit, particularly in Brazil, rather than as an evidence-based practice. What is rarely observed, however, is that the generalized use of block letters effectively fragments the acquisition of reading, since the learner first learns to read using block letters and, once reading is achieved and interpretative processes (or literacy practices) should begin, the learner must “stop everything” and restart the decoding process of lowercase letters, as will be discussed later through the lens of cognitive load theory. In the third stage of this fragmented process, the student encounters cursive handwriting. After this third stage, students inevitably pass through a phase in which the three forms of letters become mixed, a phenomenon rarely discussed in the literature despite its frequent occurrence in classroom practice.

1.2 Neurocognitive Evidence for Multiple Scripts

The acquisition of reading involves the specialization of neural circuits located in the Visual Word Form Area (VWFA), a region that progressively adapts to exposure to different scripts (DEHAENE, 2009, 2020). This means that the greater the diversity of graphic stimuli from the earliest stages of literacy acquisition, the more flexible and efficient the neural organization associated with word recognition tends to become. Although Dehaene (2009, 2020) observes that writing systems adapt to the constraints of the human visual system, this observation does not amount to a defense of the pedagogical simplification of graphic input. The neural specialization described by the author depends on functional differentiation and on the progressive consolidation of relevant distinctions,

including those that require inhibiting general perceptual mechanisms, such as mirror invariance, a process that cannot be reduced to exposure to simplified geometric forms.

Recent evidence reinforces this point. The study by Torres et al. (2021) demonstrates that the human visual system is born with mirror invariance, an adaptive mechanism that enables object recognition regardless of orientation, but that must be selectively inhibited for efficient reading consolidation. This inhibition does not arise from the simplification of input but from the functional refinement promoted by systematic exposure to relevant graphic distinctions, a process whose consolidation is further reinforced during sleep.

In addition, research in the neuroscience of education shows that handwriting is not merely a motor exercise but also activates motor, visual, and linguistic circuits in an integrated manner. James and Engelhardt (2012) show that this activation becomes even more robust when children also practice cursive handwriting, since the continuous stroke and the need for motor planning strengthen the coordination between perception and written production. Instruction that incorporates multiple scripts, therefore, favors both the neural specialization of reading and the strengthening of the connections between different brain areas responsible for language.

Beyond the neuroscientific evidence, studies in cognitive psychology and education point to concrete benefits of systematic exposure to different scripts. Ehri (2005) shows that the combined use of scripts contributes to strengthening the associations between sound, spelling, and meaning, a process known as orthographic mapping, which supports the development of reading fluency. Berninger and Wolf (2009) highlight that this graphic diversity also improves spelling and expands vocabulary, since learners encounter varied representations of the written form of words. Puranik and AlOtaiba (2012) further demonstrate that cursive handwriting requires greater attention, motor planning, and working memory, resulting in important gains in the development of executive functions. Taken together, these findings show that multi-script instruction not only strengthens learners' linguistic and orthographic repertoire but also enhances cognitive and metacognitive development, constituting an essential strategy for the balanced advancement of biliteracy.

1.3 Biliteracy and Cross-Linguistic Transfer

In the field of biliteracy, Cummins (1979, 2001) proposes the notion of Common Underlying Proficiency (CUP), according to which cognitive and academic skills developed in one language can be transferred to another, provided that appropriate instruction is available. Bialystok (2001, 2002) complements this perspective by demonstrating that bilingual children develop greater metalinguistic awareness and cognitive flexibility, enabling them to monitor and adapt reading and writing strategies more effectively. Koda (2007) reinforces this point by showing that cross-linguistic transfer is particularly evident in reading: phonological and orthographic skills acquired in one language can be mobilized to support decoding and fluency in another, provided that learning contexts foster such transfer.

From a neuroscientific perspective, Dehaene (2009, 2020) shows that the acquisition of reading recruits common neural circuits, especially the Visual Word Form Area (VWFA), which become progressively specialized as exposure to different graphic systems increases. This perspective highlights that language integration is not limited to specific pedagogical practices but reflects shared brain mechanisms involved in language and writing processing, which allow experience in one language to support development in the other.

In this sense, coherence between the graphic systems to which the child is exposed, particularly in bilingual contexts in which Portuguese and English present distinct typographic conventions, ceases to be merely an aesthetic or methodological issue and instead becomes a relevant factor for the efficient consolidation of reading and writing in both languages.

1.4 The Hegemony of Block Letters and Its Cognitive Implications

The exclusive maintenance of block letters in literacy instruction, in addition to impoverishing the brain stimuli to which learners are exposed, and their potential

benefits³ creates a mismatch between what children are taught to write and what they actually read in authentic materials, particularly in bilingual contexts where lowercase and cursive forms predominate. This mismatch is not merely aesthetic or typographic but also cognitive: it may compromise reading fluency and learner motivation, as children are required to continuously adapt between different graphic representations.

Instead of allocating cognitive resources to comprehension and critical assessment of the text, children are compelled to return to the basic level of recognizing letter forms, a process that should already have been consolidated through exposure to multiple scripts from the outset. Studies on cognitive load (SWELLER, 1988; PAAS & AYRES, 2014) suggest that this reworking increases the extraneous cognitive load of learning, diverting mental resources from more complex comprehension processes⁴. In addition, research on reading (EHRI, 2005; DEHAENE, 2009) indicates that the automatization of orthographic recognition is a prerequisite for the reader's attention to shift toward higher levels of linguistic and discourse analysis. When attention remains focused on letter forms, the development of reading fluency is postponed, and the emergence of critical literacy skills that should arise in the early stages of literacy is delayed.

Adopting a pedagogy consistent with the science of reading, therefore, implies exposing children early to different scripts (graphic forms) and contextualizing them in real tasks, such as identifying names, writing in journals, and reading illustrated books. Furthermore, in international schools, integrating scripts from the beginning avoids fragmentation between literacy in Portuguese (block letters) and reading in English (print/cursive). It thus becomes necessary to move beyond the pedagogical hegemony of block letters and align literacy instruction with recent findings in neuroscience and bilingual education.

In this sense, the present study was designed to investigate how a bold curricular change, namely the simultaneous introduction of multiple scripts from the beginning of

³ As discussed in the previous section.

⁴ Cognitive Load Theory, originally proposed by Sweller (1988) and later expanded by Paas and Ayres (2014), distinguishes among intrinsic load (inherent to the content), extraneous load (resulting from the way the content is presented), and germane load (associated with deeper cognitive processing). In the context of literacy instruction, the exclusive reliance on block letters tends to increase extraneous cognitive load, as it requires children to allocate cognitive resources to graphic recognition rather than directing them toward comprehension and critical analysis of the text.

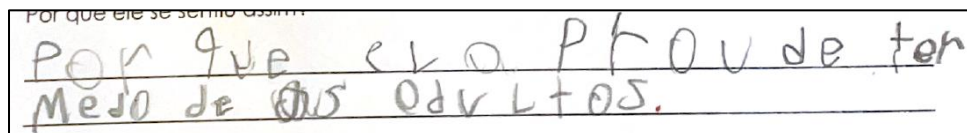
literacy instruction, might influence the development of writing in an international bilingual context. The goal is to analyze, based on concrete data, whether theoretical expectations resonate in practice and whether the gains described in the literature can indeed be observed in everyday school contexts.

2. A STUDY IN A BILINGUAL CONTEXT

This study is observational in nature and adopts a qualitative and longitudinal approach, conducted in an international bilingual school in São Paulo. It is a bilingual immersion school in which literacy instruction takes place simultaneously in Portuguese and English. In the early years, children are exposed to an English-only immersion regime, shifting to a balance between the two languages from the early years of elementary school onward. The literacy process is therefore planned in two languages in an integrated manner, supported by linguistic and neuroscientific perspectives that emphasize the importance of early and varied written input.

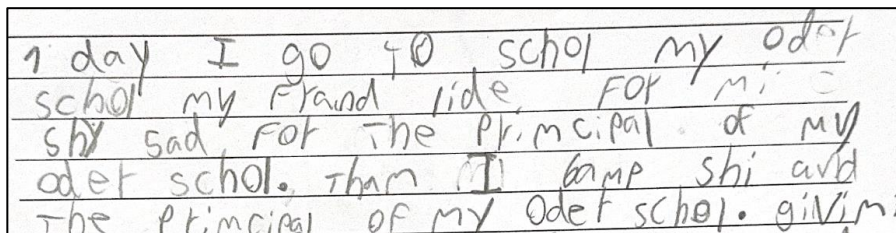
The starting point of the investigation was the identification, in 2019, of a recurring problem in the literacy process: students in the 4th and 5th grades had serious difficulties consolidating cursive handwriting, along with frequent inconsistencies across different scripts. It was common to observe productions that mixed block letters, print script, and cursive handwriting within the same text, without stable mastery of any of them. This difficulty was attributed to a fragmented teaching process, in which scripts were introduced gradually and in a delayed manner, creating a gap between what was taught for writing and what children needed to read in authentic materials.

Figure 1 – 4th grade



Source: Research., 2019

Figure 2 - 5th grade



Source: Research, 2019.

Figures 1 and 2 exemplify this contrast: in 2019, productions by students in the 4th and 5th grades reveal the mixture of block letters, print script, and cursive handwriting within the same text, demonstrating the absence of graphic consolidation; in 2024, already in productions from the 2nd grade, as will be presented later, consistency in the use of scripts and stable legibility can be observed, demonstrating the early consolidation of writing after the implementation of the new pedagogical proposal.

The data collection underlying this study was made possible because the school, as part of its institutional philosophy, periodically conducts internal assessments to monitor learning. This practice serves a dual function: to monitor students' progress and, at the same time, to generate internal data that make it possible to critically evaluate the effectiveness of the curriculum and the teaching approaches adopted. Unlike schools that rely solely on external guidelines, this institution maintains a posture of continuous self-evaluation and does not hesitate to revise methodologies when evidence indicates a need for change. In this sense, the data collection described here was not conducted as an isolated experiment but rather as part of a continuous process of generating internal evidence to support pedagogical decision-making.

It is important to emphasize that no specific data collection instrument was developed, as the data emerge naturally from everyday school activities: they are drawn from real tasks carried out in the classroom, within authentic learning contexts. These activities include various assessments administered in Portuguese and English, such as phonological awareness exercises (recognition of initial, medial, and final sounds), word and sentence writing to verify grapheme-phoneme correspondence, reading high-frequency word lists, identifying segments in short narratives, and shared reading tasks. The set of these instruments, already incorporated into the pedagogical routine, ensures

that the collection process remains continuous and integrated into school practices, rather than representing an artificial experimental procedure.

In total, records from approximately 1,500 students were examined, in 2019 and in 2024, from the 1st to the 5th grades of elementary education, constituting a robust set of observational evidence. Although only a few samples are presented in this article for illustrative purposes, the breadth of the corpus ensures that the contrasts highlighted here are not isolated cases but rather recurring patterns that consistently emerged throughout the data collection.

Based on the 2019 diagnosis, a substantial curricular restructuring of the literacy process was proposed: from their first encounters with writing, students began to be exposed to multiple scripts (uppercase letters, lowercase letters, print script, and cursive handwriting) in teaching materials, classroom displays, handwriting activities, and shared reading and writing practices. This change represented a break with the predominant model of literacy instruction in Brazil, centered on block letters, and may be considered a bold pedagogical decision, though one grounded in scientific evidence on reading and writing.

Data collection for comparative analysis took place at two main moments:

1. Initial diagnosis (2019): analysis of the written productions of students in the 4th and 5th grades, identifying the absence of writing consolidation and the recurring mixture of different scripts (graphic forms). The choice of learners in the 4th and 5th grades was motivated by the fact that writing would already be expected to be consolidated at this stage.

2. Follow-up (2024): analysis of the written productions of students from different grade levels after the implementation of the new pedagogical proposal, in which early and consistent consolidation of scripts could already be observed.

Although the collection encompassed other grade levels, this study presents, for reasons of brevity, only examples from 2019 (4th and 5th grades) and from 2024 (2nd grade and already stabilized 5th grade). The selection of 2024 samples is justified because, already in the 2nd grade, it was possible to clearly observe the consolidation of writing and graphic stability, robustly evidencing the effects of the curricular change at a very early stage.

The corpus of the study, therefore, consisted of written records collected as part of institutional internal assessments in 2019 and 2024⁵, enabling longitudinal analysis. The focus of the investigation was to determine whether early, integrated exposure to multiple scripts led to perceptible gains in writing consolidation. To this end, the following aspects were observed: (i) the degree of consistency in the use of scripts; (ii) the presence or absence of mixing among block letters, print script, and cursive handwriting within the same production; (iii) graphic fluency and the overall legibility of the texts.

Thus, the methodology of this study reflects the institutional philosophy of constant investigation of pedagogical practice itself, articulating diagnosis, intervention, and follow-up within a continuous cycle of evidence-based evaluation. The observational and longitudinal nature of the work, combined with the use of data collected in a real educational context, enables clear documentation of the effects of a curricular change that broke with established traditions in Brazilian literacy instruction. By presenting the results of the 2019 and 2024 collections, the study seeks to demonstrate how early and integrated exposure to multiple scripts can favor the consolidation of writing in a more efficient, stable manner aligned with the cognitive and bilingual demands of learners, and how the organization of graphic input may directly influence this consolidation process.

Although the data are robust, this study remains observational in nature, and further controlled investigations may expand these findings.

3. RESULTS

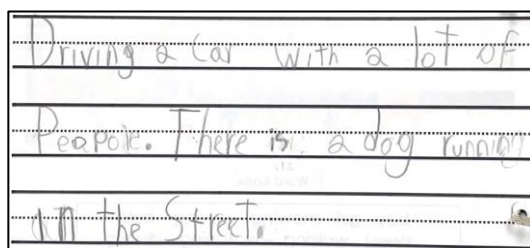
The results of the analysis of the written productions reveal striking differences between the initial diagnosis (2019) and the most recent data collection (2024). In 2019, it was observed that students in the 4th and 5th grades exhibited significant inconsistencies in writing, with a lack of script consolidation. In many cases, the texts displayed the combination of different types of letters (block letters, print script, and cursive

⁵ Assessments were conducted quarterly across all grade levels, from the 1st to the 5th grades, as the change in the literacy approach required close monitoring of the process. For the purposes of this study, however, only comparative data from selected grade levels in 2019 and 2024 were considered.

handwriting) within the same production, indicating that the students had not yet fully mastered any of them.

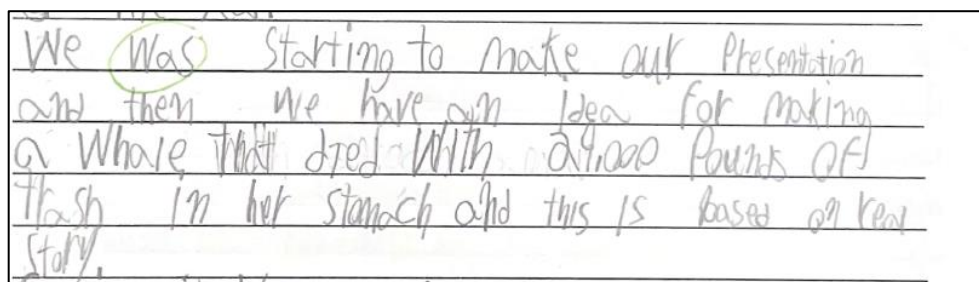
Figures 3 and 4 exemplify these 2019 productions, in which the mixture of scripts within the same text reveals graphic instability and the lack of consolidation expected at this stage of schooling.

Figure 4 – Mixture of scripts



Source: Research, 2019.

Figure 4 – Mixture of scripts

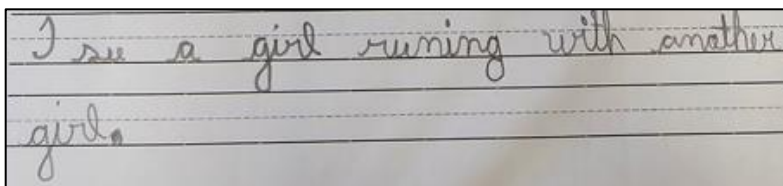


Source: Research, 2019.

After implementing the pedagogical proposal that introduced multiple scripts at the beginning of literacy instruction, the results from 2024 indicate a markedly different scenario. Already in the 2nd grade, students demonstrated stability in their use of scripts, with early mastery of cursive handwriting and no inconsistencies previously observed. The texts display fluency, legibility, and consistency, suggesting that the simultaneous exposure to different graphic forms contributed to faster and more effective consolidation of writing.

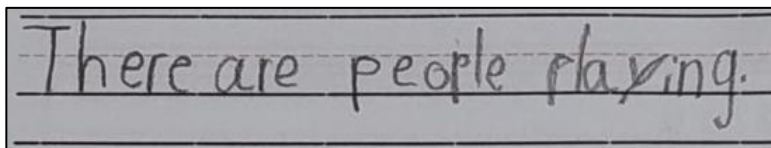
Figures 5 (2nd grade) and 6 (5th grade) present productions from 2024, in which one can observe the early consolidation of cursive handwriting, the uniform use of different scripts, and graphic stability even in the early stages of the literacy process.

Figure 5 - 2nd grade



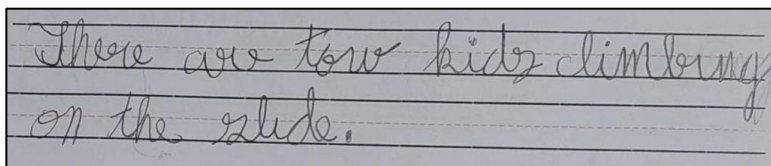
Source: Research, 2024.

Figure 6 (5th grade)



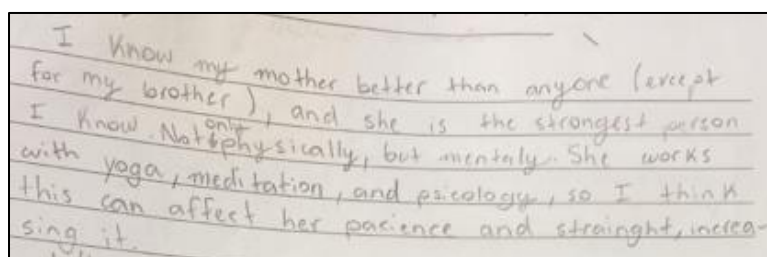
Source: Research, 2024.

Figure 5 - 2nd grade



Source: Research, 2024.

Figure 8 (5th grade)



Source: Research, 2024.

From a qualitative perspective, the main contrasts identified are presented in Table 1.

Table 1 – Qualitative comparison between 2019 and 2024 in the literacy process

Dimension	2019 (traditional model – block letters)	2024 (multi-script model – block letters, print script, and cursive handwriting)
Graphic stability	Fragmented and unstable productions, a mixture of forms and scripts	Uniform and confident use of scripts

Dimension	2019 (traditional model – block letters)	2024 (multi-script model – block letters, print script, and cursive handwriting)
Reading-writing alignment	Gap between literacy instruction in Portuguese (block letters) and authentic materials in English (print/cursive)	Greater coherence between practices; fluency favored
Developmental timing	Students in the 4th and 5th grades still presenting unstable productions	Already in the 2nd grade (2024), consolidation and stability could be observed, evidencing a significant temporal gain

Source: Research, 2026.

These results demonstrate that the curricular change, although contrary to the predominant model of literacy instruction in Brazil, generated immediate and lasting effects, making literacy instruction more efficient and better aligned with cognitive and bilingual demands. In sum, the longitudinal analysis shows that the early and integrated introduction of multiple scripts not only reduced graphic inconsistencies but also, by several years, anticipated the consolidation of cursive handwriting compared with the traditional model based exclusively on block letters.

CONCLUSION

This study examines literacy in a bilingual context from a linguistic and neurocognitive perspective, challenging the predominance of block letters in the early years of schooling in Brazil. The longitudinal analysis of written productions collected in 2019 and 2024 clearly documented the effects of the early and integrated introduction of multiple scripts (block letters, print script, and cursive handwriting) at the beginning of the literacy process. The results showed that, whereas in 2019, students in the 4th and 5th grades who had begun literacy instruction exclusively with block letters still exhibited graphic instability and inconsistency, in 2024, it was already possible to observe, in the 2nd grade, the consolidation of cursive handwriting and stability in the use of graphic forms.

The data and their longitudinal contrasts between 2019 and 2024, therefore, illustrate that the early and integrated introduction of multiple scripts not only reduced

graphic inconsistencies but also, by several years, anticipated the consolidation of cursive handwriting compared to the traditional model centered exclusively on block letters.

These findings reinforce the argument that literacy should be understood as a constitutive part of linguistic development, functioning as a second stage of input, now formal and written, which expands the linguistic system already acquired. In Chomskyan terms, this process may be interpreted as the construction of the left periphery (CHOMSKY, 1981), activated through schooling. According to Kato (2005), this expansion is characterized as a “grammar of the literate,” while Roeper (1999) reminds us that every speaker may be viewed as bilingual between their core grammar and the expansions triggered by contact with new systems, such as written language and the wide range of possibilities and information that accompany it. The empirical results presented here show that this expansion occurs more effectively when the learner is exposed, from the outset, to a variety of graphic registers that reflect the reality of the textual input they will encounter.

From a pedagogical perspective, the experience described here underscores the urgency of overcoming the exclusivity and hegemony of block letters, critically reassessing their centrality in early literacy instruction, and adopting practices that are more consistent with recent discoveries in neuroscience and linguistics. The multi-script approach not only promotes cognitive and metalinguistic gains but also ensures greater alignment between the writing systems of Portuguese and English, which is crucial in international bilingual schools. It is therefore a bold pedagogical decision, yet one grounded in evidence and capable of generating lasting impacts on learners’ development.

Finally, I acknowledge that this study is observational in nature and limited to a specific context. Nevertheless, the results obtained, particularly given the volume of data collected, invite the expansion of this line of investigation, whether through broader quantitative analyses or comparisons among different models of literacy instruction in bilingual and monolingual schools. By highlighting the need to align school practices with the science of reading, this study contributes to a broader discussion of literacy in Brazil and to identifying possible paths to make this process more effective, coherent, and emancipatory.

In light of the results presented here, I would like to extend the exercise of critical reflection to the process of literacy instruction in monolingual contexts as well. If, in bilingual programs, early and integrated exposure to multiple scripts produces clear gains in graphic consistency, fluency, and the integration of reading and writing, there is no robust empirical evidence to support maintaining block letters as the sole initial stage in L1 literacy instruction. In addition, such a model may impose an unnecessary cognitive burden on learners: as proposed by cognitive load theory (SWELLER, 1988; PAAS & AYRES, 2014), the exclusive reliance on block letters increases extraneous cognitive load, as it compels children to allocate processing resources to mere graphic recognition rather than directing them toward textual comprehension and the critical analysis of content. The data suggest that this model not only delays the consolidation of writing but also compromises the full development of reading competence by shifting effort toward the graphic level rather than toward constructing meaning. The persistence of this tradition, widely naturalized in monolingual schooling, may reflect more a form of pedagogical inertia than linguistic or neuroscientific evidence. It is therefore important that researchers, teacher educators, and practitioners recognize that the so-called “hegemony of block letters” offers no convincing grounds for its maintenance even in L1 literacy instruction: insisting on it is to perpetuate a methodological model whose effectiveness finds little consistent support in the contemporary scientific literature.

Ultimately, the exclusive use of block letters underutilizes the learner’s cognitive potential. Recent studies demonstrate that this neural reorganization involves, among other mechanisms, the selective inhibition of general perceptual processes such as mirror invariance, and the refinement that depends on exposure to relevant graphic distinctions (TORRES et al., 2021). By restricting children to a single graphic register, they are deprived of the opportunity to fully explore this potential and to stimulate neural networks that thrive precisely in the presence of variety and complexity. In this sense, more is not less: it is better. Graphic diversity stimulates, challenges, and enriches learning. “Finding the appropriate law or logical rule that accounts for all available data is the ultimate means to massively accelerate learning - and the human brain is exceedingly good at this game.” (DEHANE, 2020, 35). It is in this sense that literacy must be conceived: not as an exercise

in excessive simplification, but as an opportunity to activate, from the very beginning, the remarkable capacity of the human brain to learn.

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