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Original articles

Orthographic profile of schoolchildren after returning to in-person classes in times of pandemic

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ABSTRACT

Purpose: to assess the orthographic profile of schoolchildren, after returning to in-person classes, during the pandemic.

Methods: a cross-sectional, quali-quantitative study involving 50 children aged 9 and 10 years old, enrolled in the 4th grade of private schools. Participants were divided into two groups based on the teaching modality adopted in the second semester of 2021: a hybrid group (remote and in-person learning) and a fully in-person group. Data collection occurred through teacher referrals, who also completed a questionnaire on the students' academic performance. The collective version of the Pró-Ortografia protocol was used, including dictation tasks (words, pseudowords, and pictures) and written production. Data were analyzed using the Student's t-test with a 5% significance level.

Results: the hybrid group showed a significantly higher average of phoneme-grapheme correspondence rule-based errors in the pseudoword dictation (6.1 ± 3.3) compared to the in-person group (4.4 ± 2.1; p = 0.001). Significant differences were also found in accentuation errors in both pseudowords (1.3 ± 0.7 vs. 0.7 ± 0.9) and words (9.9 ± 4.8 vs. 7.2 ± 4.5), both with p = 0.001.

Conclusion: hybrid teaching was associated with a higher frequency of orthographic errors, suggesting negative impacts on orthographic learning.

Keywords: Pandemics; Education, Distance; Learning; Education, Primary and Secondary

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INTRODUCTION

The development of writing is a cultural invention created to record speech and linguistic content, overcoming barriers of time and space. As it derives from speech, learning to write requires the child to have developed oral language and possess a complete phonological system, since they will need to assign sounds to graphic signs, relying on their orality[1].

Learning to write in Portuguese is a complex process. Initially, the child must understand and relate oral and written language and, subsequently, recognize the phoneme-grapheme relationships, which exhibit little regularity. Only seven phonemes (/p, b, t, d, f, v, k/) have a direct correspondence with letters. However, there are multiple representations for the same sound (e.g., /s/ → s, c, ç, x, ss, sc, z, xc), multiple sounds for the same letter (e.g., s → /s/ and /z/; x → /s/, /z/, /ʃ/, /ks/), and even silent letters (e.g., h). Moreover, there are open, closed, and nasalized vowels (e.g., a/ã; e/é; o/ó/õ), in addition to contextual and morpho-grammatical regularities, making orthography a continuous challenge[2].

Mastering writing involves different cognitive processes, especially in orthographic acquisition. This develops throughout schooling, becoming consolidated through experience, learning, and memorization processes[3].

Words written as pronounced have a direct phoneme-grapheme correspondence and are based on the phonological route, being characterized as Natural Orthography. Words associated with orthographic visual-lexical memory are based on the Orthographic route and are characterized as Arbitrary Orthography[4].

For a child to access the phonological route, it is essential that they develop the ability to perceive and manipulate speech sounds, which allows them to understand the alphabetic principle, that is, the idea that letters represent sounds[1].

In this process, the precise and regular tracing of words also contributes to attention to word composition and its orthographic features, facilitating self-monitoring and self-correction[5]. The analysis of errors and their occurrence allows understanding of the level of internalization of rules, as well as guiding appropriate pedagogical and therapeutic strategies.

Writing, in addition to being an essential communication skill, is crucial for academic performance. This learning requires close monitoring, constant pedagogical mediation, and systematic practice, factors that were heavily affected by the arrival of the COVID-19 pandemic, which brought numerous changes to our routine, habits, and behaviors. With the need for social isolation, the temporary closure of schools, and consequently the suspension of in-person classes, new strategies had to be adopted to ensure continuity of education. At least 190 countries had their classes suspended, impacting the lives of 1.57 billion students[6].

In the first semester of 2020, remote learning was implemented on an emergency basis to protect students and their families, as they could be vectors for transmitting the disease due to daily contact with people in their homes and communities[7]. This period of confinement imposed by the pandemic restricted social interaction and interrupted face-to-face contact.

The Ministry of Education (MEC) adopted measures and, through MEC Ordinance No. 343 of March 17, 2020, authorized the replacement of face-to-face classes with digital learning while the pandemic lasted[8]. With the suspension of in-person classes, families assumed a more active role in children's learning[9,10].

Thus, 2020 was a year of intense rethinking of knowledge and teaching methods, with the necessity of digital technology usage by schools, administrators, coordinators, teachers, students, and their families. The relationship between teaching and learning had to be rapidly transformed, with the development of strategies to maintain the education of our learners[7]. In this context, the teaching-learning process underwent restructuring, initially adopting the remote model, evolving to a hybrid format (remote and in-person), and later gradually returning to the exclusively in-person modality[8].

Remote learning was a temporary and emergency solution, serving as an alternative to in-person education[11]. During this teaching period, several adaptations occurred in the educational sphere involving families, administrators, teachers, and students[12], increasingly relying on technological learning resources. However, despite advances in educational technology, writing remains the primary form of graphic communication and an essential skill both inside and outside the classroom[13]. Its mastery influences learning, self-esteem, and psychosocial aspects[14], impacting students' futures after the entire period of pedagogical reformulation.

Strategies adopted by private and public school systems varied. Private schools invested in digital platforms according to their capabilities and adapted as they gained experience, reinventing themselves

to meet the new reality and emerging needs[15]. Public schools faced more challenges with digital platforms and also used printed materials to supplement home learning, among other alternatives[16]. In this context, questions arise about the impact of the pandemic on the literacy process.

Did students who were in the second year of primary education in 2020, during the complete suspension of in-person classes and the exclusive adoption of remote learning, successfully develop reading and writing skills? Did they enhance fine motor skills for cursive writing, for example? Furthermore, these students lacked formal in-class instruction with direct teacher support.

Considering that, in the 4th year, students are expected to be literate and to be consolidating and advancing in orthographic and cursive writing skills, we aimed to investigate the orthographic profile of children aged 9 to 10 years enrolled in this school year of primary education.

According to the Brazilian National Common Curricular Base (BNCC), at this stage, students should demonstrate mastery of phoneme-grapheme correspondences, appropriate use of accentuation, punctuation, morphological word structure, and dictionary use to expand their linguistic repertoire[2].

It is believed that the results of this study will contribute to identifying possible gaps in writing development and will provide a basis for preventive or remedial educational and therapeutic actions.

In light of this, the objective of this study was to assess the orthographic profile of schoolchildren after returning to in-person classes during the pandemic.

METHODS

This is a cross-sectional study with a qualitative-quantitative approach. It complies with ethical standards and the guidelines of Normative Resolution 466/12 of the Brazilian National Health Council. The study was submitted to and approved by the Research Ethics Committee (CEP) of the Federal University of São Paulo (UNIFESP), Brazil, under opinion number 0790/2022, CAEE 62055822.1.0000.5505.

After approval, the project was presented to the administrations of private schools, with clarification of objectives, methods, confidentiality of information, potential benefits, and contributions to the scientific community. Upon agreement from two institutions, data collection took place during the second half of 2022.

Teachers were invited to participate and signed the Free and Informed Consent Form (FICF). They completed a questionnaire developed by the researchers, which contained information about the student, such as: personal data, school grade, date of enrollment at the school, mode of education maintained from the second semester of 2021, hand dominance, data on learning performance (strengths and difficulties), emotional and oral communication/speech characteristics. This information aided the selection process according to the inclusion criteria. Subsequently, parents were contacted to learn about the project and authorize the child's participation by signing the FICF. The schoolchildren also signed an assent form, written in language appropriate to their level of understanding.

The participants were 9- and 10-year-old literate children enrolled in the 4th year of Elementary School (1st stage), attending schools with a socio-interactionist approach, which values the interaction between individual and environment in the construction of knowledge. It is therefore considered that, during the pandemic period, teachers, students, and families needed to be actively involved in the learning process.

Only children who were literate and had completed the literacy process participated. Exclusion criteria were: diagnosis of learning disorders, cognitive deficits, neurological conditions, genetic syndromes, sensory or motor impairments, speech disorders, incomplete assessment, or lack of parental consent.

As shown in Figure 1, 96 children were recruited from two private schools in the city of Santos. At School 1, of the 38 initially selected children, one was excluded for being absent during assessment, and 12 did not participate due to lack of parental consent. At School 2, of the 58 children, 13 were excluded for the same reason, two refused to continue the process, and three did not meet the inclusion criteria. In the end, 50 children participated in the study.

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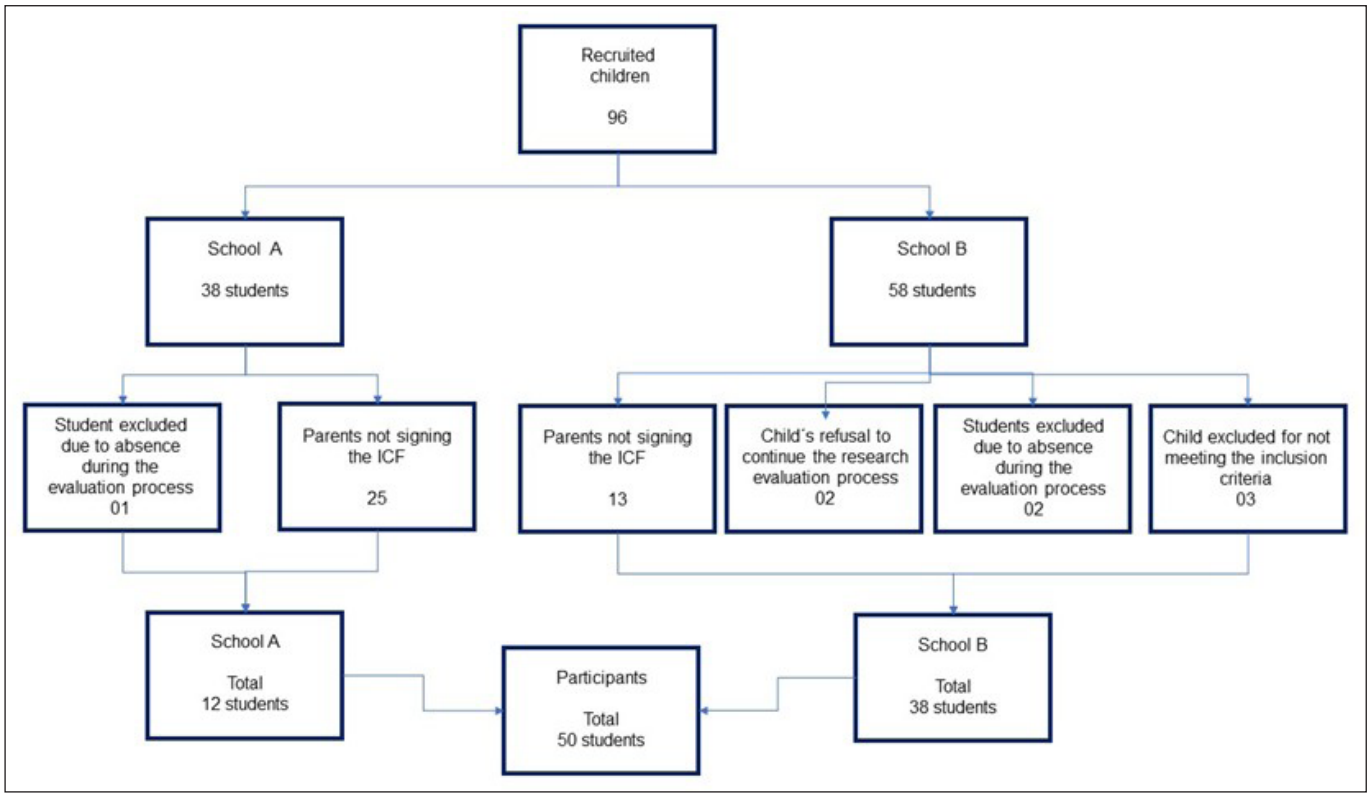

Figure 1. Flowchart with study participants

The sample was defined by convenience, considering accessibility to schools, institutional authorization, and parental and child consent to participate in the study.

The evaluation of participants who met the inclusion criteria and agreed to participate was conducted by the lead researcher, a speech-language pathologist, who strictly followed the application guidelines for the group version of the assessment described in the *Introductory Manual of the Pró-Ortografia Protocol*[3].

The assessments were administered at the schools during regular class hours. The pedagogical staff (coordination and teachers) had previously defined the schedule and location of the assessments to ensure no disruption to curricular activities or external interference.

Based on the information provided by teachers through the questionnaire, participants were organized into two groups according to the mode of instruction adopted in the second semester of 2021: a hybrid group (remote and in-person activities) and a fully in-person group (exclusively face-to-face instruction).

The assessment was conducted in groups, over two separate sessions, with a seven-day interval between them.

The *Pró-Ortografia Protocol* is the result of a master's research project that characterized, classified, and identified the orthographic performance of students from the 2nd to the 5th year of Elementary School. The study was carried out in both public and private schools, across various Brazilian states. The classification of orthographic errors followed the semiology of errors, with adaptations to the linguistic reality of Brazil[17].

Regarding its psychometric properties, the protocol demonstrated internal consistency validity, confirming its objective of evaluating the knowledge and use of Portuguese orthographic conventions. The results indicated a high correlation among most of the applied tasks, demonstrating no contradictions between them[17]. Content validity was ensured by the non-random selection of the words and terms included in each task, which underwent specific linguistic refinement aligned with the goals of the assessment. This process involved four supervisory sessions with a linguist, totaling sixteen hours of discussion on the tests, their objectives, and the lexical items they contained[17]. However, the authors did not assess reliability.

For scoring, the evaluator assigns a number corresponding to the type of orthographic error, according

to Table 1. A word may contain one or more errors, which should be classified accordingly. At the end, all orthographic errors are analyzed and classified, and their total is calculated separately, resulting in a single score.

The errors observed in these tasks were divided into two categories: (1) Natural – directly related to language processing; and (2) Arbitrary – which require visual memory, knowledge of orthographic, lexical, and morphological rules, based on the order of orthographic acquisition. Errors were classified by type, as shown in Table 1, which presents the classification of orthographic errors from the *Introductory Manual of the Orthography Assessment Protocol for Students from the 2nd to the 5th Year of Elementary School – Pró-Ortografia* (2014). It is also considered that a single word may present more than one type of error.

Table 1. Classification of spelling errors

Orthography	Number	Type	Meaning
Natural	1	PGC/U	Unambiguous Phoneme–Grapheme Correspondence. It occurs when the original phoneme is altered.
Natural	2	SOA	Segment omission or addition, e.g., "poba" instead of pomba.
Natural	3	SAO	Segment order alteration, e.g., "prota" instead of porta.
Natural	4	ISWJ	Incorrect separation or joining of words, e.g., "achoque" instead of acho que.
Arbitrary	5	PGC/DR	Phoneme–Grapheme Correspondence dependent on phonetic context/position, e.g., "carinho" instead of carrinho.
Arbitrary	6	PGC/IR	Phoneme–Grapheme Correspondence independent of rules, i.e., errors involving irregular correspondences, e.g., "sugeito" instead of sujeito.
Arbitrary	7	IPAU	Inappropriate presence or absence of diacritics (acute and circumflex accents).
–	8	OA	Other findings (e.g., letter reversal or tracing problems, invented or unrelated word).

Source: Batista, Cervera-Mérida, Ygual-Fernández, & Capellini (2011).
Captions: Errors: PGC/U = Unambiguous Phoneme–Grapheme Correspondence; SOA = Segment Omission or Addition; SAO = Segment Alteration in Order; ISWJ = Improper Separation or Joining of Words; PGC/DR = Phoneme–Grapheme Correspondence Dependent on Rules (contextual or morphological); PGC/IR = Phoneme–Grapheme Correspondence Independent of Rules; IPAU = Inappropriate Presence or Absence of Diacritics (acute or circumflex); OF = Other Findings (reversed or poorly traced letters, unrelated or invented words).

The classification of mean scores in the tasks is divided into: low performance – lowest number of correct answers; average performance – scores between the 25th and 75th percentiles; and high performance – highest number of correct answers, above the 75th percentile. Although results may be described in terms of correct answers, the adopted classification is based on the number of errors, such that lower scores indicate better orthographic performance.

During the Pró-Ortografia assessments, the use of erasers was not allowed. Participants were instructed to make corrections by placing the incorrect word or letter in parentheses and rewriting it afterward, as they deemed correct.

Assessments were administered sequentially, allowing only one repetition per dictated word. The protocol consisted of three tasks:

Task 1: Pseudoword Dictation – composed of 36 invented, semantically meaningless words, with the stressed syllable highlighted for proper pronunciation, as per the manual. The task included two monosyllabic, twelve disyllabic, twenty trisyllabic, and two polysyllabic words.

Task 2: Picture Naming Dictation – composed of 39 images of animals (domestic and wild). Children were instructed to write the name of the animal corresponding to each figure. If they did not know the name, they could ask the researcher for a clue; if they still did not recognize the image, the answer was to be left blank.

Task 3: Thematic Writing Based on Pictures – involved the presentation of four sequential images followed by a final image with a question mark, prompting the child to complete the story creatively. Participants were instructed to write a story based on the theme *"The danger of releasing balloons"*. They were guided to structure their text with a title, introduction, development, and conclusion, using

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appropriate punctuation. There was no word limit, and narrative elaboration was encouraged. As in the other tasks, incorrect spelling had to be indicated in parentheses, and erasers were still prohibited.

Data were analyzed using IBM SPSS Statistics v.27 (Armonk, NY: IBM Corp.), adopting a 5% significance level.

Descriptive statistical analysis included the mean and standard deviation of variables related to orthographic errors, as well as absolute and percentile frequency distributions of the sample characterization variables (sex, teaching modality, school) and data from the teacher questionnaire.

Data normality was verified using the Shapiro-Wilk test, which indicated a normal distribution. Subsequently, the Student's *t*-test was applied to compare the variables „total number of words produced in thematic writing" and „total number of orthographic errors by dictation task type" between the different groups.

RESULTS

The sample consisted of 50 children, 29 females and 21 males, with a mean age of 9.2 years (±0.3). Students from two private schools in the municipality of Santos participated in the study, distributed between morning (n=26; 9 in face-to-face and 17 in hybrid learning) and afternoon periods (n=24; 17 in face-to-face and 7 in hybrid learning), as shown in Table 2.

At School 1, three 4th-grade classes participated (two in the morning and one in the afternoon), while School 2 included two classes (one morning and one afternoon). From the second semester of 2021, participants were enrolled in either face-to-face (n=26) or hybrid (n=24) learning. No student remained exclusively in remote learning during the analysed period.

Table 2. Characterization of the sample in relation to sex, school, school year, manual preference and socioeconomic level in the In-Person and Hybrid modalities

Characterization Variables	Absolute Frequency (n) IN-PERSON	Percentile Frequency (%) IN-PERSON	Absolute Frequency (n) HYBRID	Percentile Frequency (%) HYBRID	Absolute Frequency (n) TOTAL	Percentile Frequency (%) TOTAL
SEX						
Females	16	61.5	13	54.2	29	58
Males	10	38.5	11	45.8	21	42
SCHOOL						
School 1	14	53.8	24	100	28	76
School 2	12	46.2	0	0	12	24
SESSION						
Morning	9	34.6	17	70.8	26	52
Afternoon	17	65.4	7	29.2	24	48

Statistical analysis of the data revealed significant differences between the learning modalities regarding participants' spelling performance. Overall, the hybrid learning group made more spelling errors than the face-to-face group. The difference was particularly evident in the pseudoword and word dictation tasks, especially in two specific types of errors, as presented in Table 3, which shows the statistical analysis of spelling errors by type of test and learning modality, including significance values of the applied tests.

In the pseudoword dictation task, the hybrid group showed a higher incidence of errors related to phoneme-grapheme correspondence dependent on contextual or morphological rules, as well as more frequent errors involving the absence or incorrect use of diacritics. These results were statistically significant, with a p-value of 0.001 for both types of errors. Similarly, in the word dictation task, the hybrid group also had a greater number of accentuation errors, again with statistically significant difference ($p = 0.001$), reinforcing the hypothesis that this learning modality may have negatively impacted students' mastery of spelling conventions.

Table 3. Spelling errors by teaching modality

Test Type / Error Type	In-Person Teaching Mean (±SD)	Hybrid Teaching Mean (±SD)	t-test	p-value
PWD – PGC	3.8 (±2.3)	3.7 (±2.3)	0.209	0.835
PD – PGC	0.4 (±0.8)	0.5 (±0.9)	-0.325	0.747
SW – PGC	0.2 (±0.5)	0.2 (±0.4)	-0.124	0.902
WD – PGC	1.7 (±1.7)	1.7 (±2.0)	-0.036	0.971
PWD – SOA	4.0 (±2.4)	3.2 (±2.3)	1.189	0.240
PD – SOA	0.6 (±0.8)	0.8 (±1.3)	-0.602	0.550
SW – SOA	0.4 (±0.7)	0.5 (±0.8)	-0.183	0.856
WD – SOA	3.2 (±2.4)	2.9 (±2.8)	0.313	0.756
PWD – SÃO	0.2 (±0.4)	0.2 (±0.3)	0.250	0.380
PD – SAO	0 (±0)	0 (±0)	0.000	0.000
SW – SAO	0 (±0)	0.1 (±0.4)	-1.423	0.161
WD – SAO	0.1 (±0.3)	0.0 (±0.2)	1.317	0.194
PWD – ISWJ	0.1 (±0.4)	0.1 (±0.3)	0.308	0.759
PD – ISWJ	0 (±0)	0.1 (±0.3)	-1.506	0.139
SW – ISWJ	0.4 (±0.6)	0.2 (±0.4)	1.182	0.243
WD – ISWJ	0.0 (±0.2)	0.0 (±0.2)	-0.057	0.955
PWD – PGC/DR	4.4 (±2.1)	6.1 (±3.3)	-2.100	0.001*
PD – PGC/DR	0.9 (±0.9)	1.5 (±1.5)	-1.677	0.100
SW – PGC/DR	0.9 (±1.4)	1.2 (±1.7)	-0.600	0.500
WD – PGC/DR	7.3 (±4.3)	8.2 (±5.8)	-0.565	0.575
PWD – IPAU	0.7 (±0.9)	1.3 (±0.7)	-2.500	0.001*
PD – IPAU	1.6 (±0.9)	1.6 (±1.0)	0.118	0.906
SW – IPAU	0.9 (±1.3)	0.5 (±0.6)	1.582	0.120
WD – IPAU	7.2 (±4.5)	9.9 (±4.8)	-2.100	0.001*
PD – PGC/IR	0.8 (±0.9)	0.7 (±0.8)	0.045	0.588
SW – PGC/IR	0.8 (±1.2)	0.5 (±0.8)	0.926	0.359
WD – PGC/IR	8.7 (±5.4)	10.2 (±5.5)	-1.007	0.319
PWD – OF	2.3 (±2.3)	1.3 (±1.7)	1.714	0.093
PD – OF	3.8 (±3.2)	3.9 (±3.2)	-0.165	0.870
SW – OF	0.8 (±1.5)	1.0 (±1.6)	-0.519	0.606
WD – OF	2.6 (±3.9)	2.8 (±4.3)	-0.184	0.855

Captions: PWD: Pseudo word Dictation, PD: Picture Dictation, WD: Word Dictation; SW: Spontaneous Writing, PGC: Unambiguous Phoneme–Grapheme Correspondence, SOA: Segment Omission or Addition, SAO: Segment Alteration in Order, ISWJ: Incorrect Separation or Joining of Words, PGC/DR: Phoneme–Grapheme Correspondence Dependent on Rules (contextual or morphological), PGC/IR: Phoneme–Grapheme Correspondence Independent of Rules, IPAU: Inappropriate Presence or Absence of Diacritics (acute or circumflex accents), OF: Other Findings (e.g., poorly formed or mirrored letters, unrelated or invented words).
* $p < 0,05$.

On the other hand, no statistically significant differences were observed between the groups in the figure dictation and thematic writing tasks, according to the analysis performed using the Student's t-test (Table 3). These findings suggest that the impact of the learning modality on spelling errors was primarily concentrated in tasks requiring greater attention to technical aspects of writing, such as arbitrary spelling and the application of orthographic rules.

DISCUSSION

This study aimed to evaluate the spelling profile of 4th-grade elementary students after the return to in-person classes during the pandemic, to identify the presence and prevalence of spelling difficulties, and to compare the spelling profiles under different teaching and learning contexts during the pandemic period (hybrid and exclusively in-person modalities).

Our findings indicated that the hybrid learning group, in the Word and Pseudoword Dictation tasks, presented an increase in spelling errors of the and PGC/DR types, and IPAU respectively, compared to the other group. This difference between the two teaching modalities suggests a possible relationship with the pandemic period, in which isolation was necessary, thus affecting the teaching and learning process[9,15].

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This observation reinforces the hypothesis of the negative impact that the pandemic may have had on children's learning, resulting in delays in spelling acquisition and in the Portuguese Language curriculum component[10,18,19], highlighting the need for greater attention to these contents.

Specifically in the case of PGC/DR and IPAU errors, teacher mediation is essential for understanding contextual and morphosyntactic rules, tonic syllables, generalisation processes, and the development of strategies, among other fundamental aspects. These results are consistent with previous studies[20,21], reinforcing the idea that direct instruction is indispensable. These skills are not acquired autonomously through reading and writing alone and require formal teaching.

This type of error (PGC/DR and IPAU) is related to arbitrary spelling. Such errors occur due to the low regularity in the phoneme-grapheme relationship, requiring knowledge of orthographic rules and the support of orthographic lexical-visual memory[17]. That is, in addition to the experience acquired via the phonological route, in which speech sounds are converted into letters and words, not always with a direct relationship between phoneme and grapheme, it is necessary to understand spelling rules that are taught by the teacher in the classroom.

Arbitrary spelling errors tend to decrease as children gain more reading experience and progress through the school years[3,17,22,23]. However, orthographic instruction must be continuous throughout school life, with an emphasis in the early years of primary education[21], so that students acquire solid knowledge and memory for orthographic rules.

Additionally, good performance in the Word Dictation task may suggest better results in the Pseudoword Dictation task, indicating mastery of phoneme-grapheme conversion and the application of spelling rules even to meaningless words, without relying on lexical-graphemic support[4].

On the other hand, considering the hierarchy of orthographic acquisition, a higher frequency of PGC/IR errors was expected[22,24-26], as these require recognition of irregular phoneme-grapheme correspondence, identification of orthographic features, and memory support for correct spelling. Moreover, given the context experienced, where reading and writing activities were reduced, an increase in these errors was anticipated.

The occurrence of spelling errors in the tasks may also be related to the need for greater attention from students in constructing this knowledge—whether through reading, formal teaching, direct teacher intervention in pedagogical practice, or even through the use of orthographic self-monitoring strategies, such as neat and legible handwriting[5].

Another relevant aspect to consider is the possible reduction in students' contact with reading, which may have hindered the consolidation of a richer orthographic lexicon[27,28]. This is exacerbated by data indicating that the pandemic negatively impacted reading and text comprehension[29], and that in 2021, approximately 40% of 4th-grade students in primary education had not yet mastered basic reading skills[30].

Reading and writing are interdependent processes, as reading requires the association between orthographic and phonological forms[3], and spelling errors tend to decrease with increased exposure to reading[31]. Although people are constantly reading online content (messages, posts, etc.), the way language is used—whether in terms of spelling, formality, or contextual rules—and how knowledge is processed may directly affect orthographic acquisition.

It is likely that spelling was not prioritised in educational attention during the studied period—by either teachers or students. Although private school students generally had access to technology, reliable internet, and suitable study environments, individual factors also impacted learning.

The need for greater autonomy in remote learning, for instance, was challenging for many children, as not all were prepared to manage their time and maintain study discipline without in-person supervision[21]. Furthermore, family participation varied. Even in households with more educated parents, work routines often prevented ongoing support[14].

Teachers, in turn, had to quickly adapt their pedagogical practices, creating strategies to sustain the teaching-learning process[32]. However, many were not adequately prepared to use the necessary technological tools, which should be considered an important factor in this context[33,34].

During the pandemic, emotional health also emerged as a relevant element. Social isolation, stress, and anxiety affected students' motivation and concentration, regardless of socioeconomic background. Although no teacher reported significant emotional changes in students during assessments, according to the initial questionnaire, these factors may have influenced performance.

From a socio-interactionist perspective, spelling learning should be built through contextualised and

collaborative practices between school, family, and student. Activities that incorporate meaningful writing, games, technologies, and text production foster linguistic awareness and learner autonomy.

Active student engagement in diverse contexts involving reading and writing supports the construction of learning, increasing both autonomy and linguistic awareness of spelling knowledge.

Thus, school–family partnerships, combined with students' active engagement, are essential for the consolidation of orthographic knowledge. Valuing diversified pedagogical practices should be a priority in educational planning, promoting more effective and meaningful learning[35].

Among the limitations of this study is its timing. Due to the pandemic, many schools were still transitioning to in-person teaching and did not allow entry of external professionals. This hindered recruitment of participating schools, as well as parent adherence, even though the study was conducted within the school environment.

Convenience sampling may have limited the generalisability of the results, as participants were selected based on researchers' accessibility during the pandemic, which may not reflect the diversity and variability of the school population.

Finally, conducting the study in both public and private schools would have allowed for a more comprehensive comparison[36], offering valuable data that could broaden understanding of students' orthographic knowledge. However, due to restrictions and challenges faced at the time, the study was limited to the private school network.

CONCLUSION

This study assessed the spelling profile of schoolchildren upon their return to in-person classes after the critical period of the pandemic, using the collective version of the Pró-Ortografia protocol, which includes different dictation tasks (Pseudowords, Words, Figures, and Writing, based on thematic images).

The results indicated a higher occurrence of spelling errors in the hybrid learning group, particularly in phoneme-grapheme correspondence and the incorrect use of diacritics (Pseudoword Dictation), and incorrect use of diacritics (Word Dictation), revealing impairments associated with this teaching model.

In-person learning proved more effective for orthographic learning, reinforcing the importance of continuous interaction between student and school environment. Hybrid learning demanded adaptations from all stakeholders, and these results highlight the urgent need for educational policies that promote equity in both access to and quality of education, regardless of socioeconomic context.

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AFCN: Conceptualization; Data curation; Data analysis; Investigation; Methodology; Project administration; Software; Validation; Visualization; Writing - Original draft; Writing - Review and editing. CSCS: Conceptualization; Data curation; Data analysis; Methodology; Supervision; Visualization; Writing - Review and editing.

Data sharing statement:

The data used in this study will not be shared in order to respect participants' privacy rights. If necessary, additional information may be provided upon request to the corresponding author by email, subject to applicable restrictions.