SPELLING PERFORMANCE OF STUDENTS OF 2ND TO 5TH GRADE FROM PRIVATE TEACHING

Desempenho ortográfico de escolares do 2º ao 5º ano do ensino particular

Simone Aparecida Capellini [1], Ana Carla Leite Romero [2],
Andrea Batista Oliveira [3], Maria Nobre Sampaio [3], Natália Fusco [4],
José Francisco Cervera-Mérida [5], Amparo Ygual Fernández [6]

ABSTRACT

Purpose: to characterize, compare and classify the performance of students from 2nd to 5th grades of private teaching according to the semiology of errors. **Method:** 115 students from the 2nd to 5th grades, 27 from the 2nd grade, 30 students from the 3rd and 4th grades, and 28 from the 5th grade divided into four groups, respectively, GI, GII, GIII and GIV, were evaluated. The tests of Spelling Evaluation Protocol – Pro-Orthography were divided into: collective version (writing letters of the alphabet, randomized dictation of letters, word dictation, non-word dictation, dictation with pictures, thematic writing induced by picture) and individual version (dictation of sentences, purposeful error, spelled dictation, spelling lexical memory). **Results:** there was a statistically significant difference in inter-group comparison indicating that there was an increase in average accuracy for all tests as for the individual and collective version. With the increase in grade level, the groups decreased the average of writing errors based on the semiology of errors. We found a higher frequency of natural spelling errors. **Conclusion:** data from this study showed that the increase in average accuracy according to grade level may be an indicative for normal development of student's writing in this population. The higher frequency of natural spelling errors found indicates that formal instruction on phoneme-grapheme correspondence may not be occurring, since that they are directly dependent on the learning of the rule of direct phoneme-grapheme correspondence.

KEYWORDS: Evaluation; Handwriting; Learning; Education; Education Status

[1] Speech Language Therapist; Professor of the Department of Speech and Hearing Therapy and Post-Graduation Program in Education at the School of Philosophy and Sciences, São Paulo State University – FFC/UNESP – Marília (SP), Brazil. Doctor and Post-Doctor in Medical Sciences from the Medical Sciences Faculty of the State University Campinas, FCM/UNICAMP-Campinas – SP.

[2] Student of Speech and Hearing Therapy at the School of Philosophy and Sciences of the São Paulo State University – FFC/UNESP-Marilia-SP, Scientific Initiation Scholarship of Foundation for Research Support of São Paulo-FAPESP.

[3] Speech Language Therapist; Post-Graduation Program in Education of the School of Philosophy and Sciences, São Paulo State University- FFC/UNESP- Marília – SP / Brazil.

[4] Speech Language Therapist, Post-Graduation Program in Education at the School of Philosophy and Sciences, São Paulo State University – FFC/UNESP, Marília – SP/Brazil;

Technical Training Scholarship of Foundation for Research Support of São Paulo-FAPESP .

[5] Speech Language Therapist and Biologist, Professor of the Department of Speech and Hearing Therapy and Director of Official Master of "Speech and Hearing Therapy Intervention" at the San Vicente Mártir Catholic University of Valencia – Valencia – España, Master in Speech Language Therapist at the Autonomous University of Barcelona / Spain.

[6] Speech Language Therapist and Psychologist; Professor of the Department of Developmental Psychology of the Department of Education and Post-Graduation Program in Learning Disabilities at the University of Valencia – Valencia/Spain and the Post-Graduation Program in Speech Language Therapist of the San Vicente Mártir Catholic University of Valencia – Valencia/Spain; Doctor in Psychology – School of Psychology, University of Valencia/Spain.

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■ INTRODUCTION

The more transparent relationship between phonology and spelling, with regard to the Portuguese language, seems to produce less severe problems in reading words, but more serious spelling[1]. This fact can be explained because the Brazilian Portuguese has a correlation more transparent in the sense of grapheme to phoneme, in decoding, than of the phoneme to grapheme, in coding, because there are less irregular correspondence in the grafofonemic conversion and more irregular correspondence in the fonografemic correspondence[1-4].

For authors[5,6], the spelling activity starts by selecting the meaning or concept of what the writer wants to write, using the first his semantic system. Then, will the syntactic structure that determine the kind of word that will occupy every position in prayer and then go to work the two routes (Route phonological and route lexical or orthographic), which will allow the writing of words. Still, after the mental spelling representation of the word, put into operation two sub-processes for achieving the written word. The first is the selection mechanism of the graphemes and the type to be used (uppercase, lowercase, uppercase, etc.) and the second consists of the purely motor, charged with performing the movements corresponding to each grapheme.

The writer uses the *phonological route* for writing pseudo words and words uncommon or unknown (and may still write them incorrectly), and uses the *lexical route* for writing the words that already make up the graphemes or spelling lexical, allowing, thus, also write words of arbitrary orthography[7].

Some authors[8,9] concluded that both the spelling and phonological processes are important for learning of writing, when in their research observed that the patterns of letters in new words more frequently were more easily learned, as well as the phonological patterns that occurred more often in words were also related to the letters more quickly.

The spelling evaluation should bring information of the spelling-level that the child is found, revealing which types of spelling errors and their frequency of occurrence in write[10,11]. In general, must include the observation of their own homework, dictation without correction and self-correcting, writing long and short texts and dictation pseudo words[6]; copying and dictation of letters[12], writing words from pictures, dictation of phrases and words, completing phrases with one or more graphemes and complete phrases with words[13], task of intentional error, which provides information about the level of orthographic knowledge that the students have[14].

We emphasize that in the literature[12,15] there is no consensus about the use of dictation letters and copying for spelling evaluation, however, it is important to consider that if the copy does not seem to provide sufficient information for an analysis of the spelling field, the dictation of letters can demonstrate to appraiser the level of knowledge of letters of the alphabet by child, since the knowledge of letters of the alphabet is developed together with the acrophonic principle, which facilitates the discovery of the alphabetic principle, already this principle the sound of the letter may be perceived in his own name.

Therefore, the analysis of data of the evaluation should be based on observation of Natural Orthography and Arbitrary Orthography[16]. The errors of natural orthography have a direct relationship with speech and language processing, metaphonological skills and domain of the alphabetic principle. In contrast, the errors of arbitrary orthography, both dependent orthography of rules, so linked to explicit knowledge of contextual rules, morphosyntactic rules and verbal derivations, as to independent orthography of rules, in the case of irregularities of the orthography notation, in which the phonographemic conversion is totally arbitrary, but agreed by the Portuguese orthography language, but without an exact rule that can be traced to the notation with security, being required, often, resorting to the dictionary for the writing of the irregular of low frequency of occurrence. Therefore orthographic errors that affect the orthography arbitrary are correlated with the visual memory in the formation of grapheme lexical and skills metamorfológicas. As examples, we can consider the use of the letter H initial, use of GI/JI and GE/JE, among others[2,16].

Based on the above, this study aims to characterize, to compare and to classify the performance of students in the 2nd to 5th year of private education according to the semiology of errors.

■ METHOD

The study included 115 students from the 2nd to 5th year of elementary school, being 56% of students were male gender and 44% female gender, of a private school in the city of Marília (SP), being 27 of the 2nd year, 30 of 3rd and 4th grade and 28 of the 5th grade, divided into four groups, respectively: GI, GII, GIII and GIV.

Were considered as exclusion criteria: students with sensory impairment, motor or cognitive and as inclusion criteria: students without visual or auditory complaints contained in the school records.

In consideration of ethics, all students evaluated showed the Consent Term signed by parents or responsible person.

The ages of the students were seven years to eleven years and eleven months. There is no parameter by gender, since the researchers were interested in the performance of all students who made up the classrooms on the 2nd to 5th year students.

After signing the Consent Term all the students were submitted the Tasks from Pro-Orthography[17] in the following order:

A. Collective Version

1. Letters of the alphabet writing (LAW): The students were instructed to write the letters of the alphabet, the vowels and consonants in separate places, with objective of verifying the knowledge about these and their classification. This test aims to verify if the students know the difference between vowels and consonants, which is necessary for the field of contextual orthographic rules.

2. Randomized Dictation of letters of the alphabet (RDLA): The students were instructed to write letters dictated, whit objective of verifying the knowledge of the student for the correspondence of the name of letter and graphic symbol that represents it.

3. Words Dictation (WP): The students were instructed to write 86 words dictated, with objective of verifying the level of knowledge of coding rules, within controlled situation and with the support of the graphemes lexicon, formed by visual input acquired and developed with the decoding skill.

4. Nonwords Dictation (NWD): The students were instructed to write 36 dictated nonwords, with objective of verifying the level of knowledge of coding rules, within a controlled situation and without the support of the graphemes lexicon, as they are nonwords, this is, without reference semantics.

5. Dictation with pictures (DP): The students were instructed to write the 39 words corresponding to pictures of animals presented, with the objective of verifying the level of knowledge of coding rules by a recovery of the phonological representation of the own lexicon.

6. Thematic written induced by pictures (TWIP): The students were instructed to write a text by presenting of pictures in sequence, with objective of verifying the phonographemic conversion within a context in which these are the authors of your writing.

B. Individual Version

7. Dictation of sentences (DS): The students were instructed to write 12 sentences dictated, with the objective of verifying if there is relationship/interference of the memory with the coding skill and also serve as base text for the test n° 8 of the purposeful error.

8. Purposeful error (PE): The students were instructed to rewrite the 12 sentences previously dictated, but with purposeful errors, with objective of verifying orthographic knowledge that these developed internally on some main cases of contextual orthographic regularities by explicit verbal of his purposeful error.

9. Spelled Dictation (SD): The students were instructed to write 29 words dictated so paused, letter by letter, with objective of verifying their capacity to perform the synthesis of dictated letters to formation of the words, by its sequence and access to the graphemes lexicon.

10. Orthographic lexical memory (OLM): The students were instructed to write 29 words as a request, with the objective of verifying the ability to access their orthography lexicon and its formation, the proportion that they use their phonological working memory.

For the correction of the tests followed the indications described in Pro-Ortografia[17]. The overall score of the tests was realized by assigning of 1 point for each correct, except in test 6 of the theme written induced by pictures, where the errors were only analyzed and classified of according to semiology. The score of the semiologycal classification of errors was performed by assigning 1 point for each type of error introduced, in tests 3, 5, 6 and 7.

The application of the collective version lasted 50 minutes and was held in two sessions. The individual version lasted 40 minutes and was held in two sessions.

The classification of errors based on their semiologia[6] was realized, following the criteria described in Pro-Ortografia[17]. With regard to naturally orthography, stand out the errors of phoneme-grapheme correspondence univocal, the errors in the sequencing of graphemes, which are related with the errors of omission, addition and change in the order of the segments, and the segmentation error of the chain of speech , which relates to the junctions and separations undue in writing. Among the errors related to arbitrary orthography, stand out those of phoneme-grapheme correspondence dependent of the phonetic context and independent errors of rules.

In addition, were added to this classification[17] the errors due to absence or inadequate presence of accentuation and other findings, relating to

problems with the letters in track and/or mirroring, illegible words and writing from other words or invented words, that school also presented.

The study was conducted after approval of the Research Ethics Committee of the Faculty of Philosophy and Science University of São Paulo State (FFC – UNESP), campus de Marília (SP), under the protocol n° 428/2009.

The statistical analysis was realized using the SPSS (*Statistical Package for Social Sciences*), in their version 17.0, based on the number of hits presented by the four groups when comparing the performance of students in the level of knowledge of orthographic rules and the number of errors that were classified according to their semiology.

The tests used to analyze the results of this study were: the Kruskal-Wallis Test, the Mann-Whitney Test adjusted by Bonferroni Correction and Spearman Correlation Analysis. The results were analyzed statistically with a significance level of 5% (0.050), broken with an asterisk in the tables relating to the results.

■ RESULTS

The Table 1 shows the mean scores, standard deviation, minimum and maximum reference value and the p-value for the performance of the groups on tests of the Pro-Orthography.

With application of the Kruskal-Wallis Test, there was this table that difference was statistically significant in all the testes of the collective and individual version of the orthography evaluate, indicating that the averages in all tests became higher with each subsequent series .

How were found statistically significant differences when comparing the groups simultaneously, we applied the Mann-Whitney Test adjusted by Bonferroni Correction to determine which groups differed from the others. The table 2 describes the p values refer to comparison groups.

The results revealed that the letters of the alphabet writing (LAW), students of the GIII and GIV showed superior performance when compared to GI; randomize dictation of letters of the alphabet (RDLA), students of the GIII showed superior performance to GI and GII. In the words dictation, students of the GIV showed superior performance if compared to GI, GII and GIII and the GII and GIII showed superior performance that GI; in the nonwords dictation, the students of the GII, GIII and GIV showed superior performance to GI; in the dictation with pictures, the students of GIII and GIV showed superior performance to GI and GII; in the dictation of sentences, the students of the GII, GIII and GIV showed superior performance to GI.

With respect the written by purposeful error, students of the GIII and GIV showed superior performance to GII; in spelled dictation, the students of the GIII and GIV showed superior performance to GI and GII, while in the writing of words by orthographic lexical memory, notes that the students of the GIII showed superior performance to GI and that of the GIV showed superior performance to GI, GII and GIII.

These data show that the GIII and IV showed a similar level of orthographic knowledge and close as the rules of the Portuguese from Brazil for all the tests evaluated in this study.

The classification of errors according to their semiology was applied to the following tests of the collective version: word dictation and dictation with pictures and in the following test of the individual version: dictation of sentences.

The table 3 are described the average errors, standard deviation, the reference values minimum and maximum and p-value for the performance of the groups in the test of words dictated.

With application of the Kruskal-Wallis Test, there was this table that occurred statistically significant differences for errors of phoneme-grapheme correspondence univocal (P/GC), omission and addition of segments (OAS), grapheme-phoneme correspondence depending of the phonetic context (P/GCDC), phoneme-grapheme correspondence independent of rules (P/GCIR) and absence or inadequate presence of accentuation (AIPA) and other findings (OF) in the test of word dictation, indicating that the average errors in each of these classifications become lower with each subsequent series.

In the table 4 are described the average errors, standard deviation, the reference values minimum and maximum and p-value for the performance of the groups in the test of the dictation with pictures.

With application of the Kruskal-Wallis Test, there was this table that occurred statistically significant differences for errors of phoneme-grapheme correspondence univocal (P/GC), omission and addition of segments (OAS), improper junctions and separations at word (IJSW), phoneme-grapheme correspondence rules independent (P/GCIR), absence or inadequate presence of accentuation (AIPA) and other findings (OF) in the test of the dictation with pictures, indicating that the average errors in each of these classifications have become lower with each subsequent series.

The table 5 describes the average error, standard deviation, the reference values minimum and maximum and the p-value for the performance of the groups in the test of dictation of sentences.

In the dictation of sentences, the results revealed a statistically significant difference for the errors of

Table 1 – Distribuition of mean, standard deviation, maximum value, minimum value and p-value concerning for the performance of: GI, GII, GIII, and GIV in evaluate orthographic test

	Test	Group	n	Mean	Standard-deviation	Minimum	Maximum	p-value
Collective Version	LAW	GI	26	19,73	8,73	0,00	26,00	< 0,001*
		GII	30	24,17	4,01	7,00	26,00	
		GIII	30	25,47	1,80	18,00	26,00	
		GIV	28	25,36	2,68	12,00	26,00	
	RDLA	GI	26	25,04	1,15	23,00	26,00	0,001*
		GII	30	23,90	4,37	5,00	26,00	
		GIII	30	25,80	0,55	24,00	26,00	
		GIV	28	25,36	1,06	23,00	26,00	
	WD	GI	26	23,88	8,84	6,00	44,00	< 0,001*
		GII	30	46,77	14,92	13,00	71,00	
		GIII	30	54,67	13,53	26,00	80,00	
		GIV	28	67,21	11,57	31,00	82,00	
	NWD	GI	26	8,96	3,70	4,00	16,00	< 0,001*
		GII	30	14,37	4,34	4,00	22,00	
		GIII	30	17,50	4,37	9,00	28,00	
		GIV	28	18,18	5,51	7,00	29,00	
	DF	GI	26	23,65	7,38	6,00	36,00	< 0,001*
		GII	30	28,07	5,55	15,00	36,00	
		GIII	30	30,00	4,33	20,00	38,00	
		GIV	28	32,93	3,92	19,00	38,00	
Individual Version	SD	GI	26	40,00	12,47	4,00	56,00	< 0,001*
		GII	30	52,13	10,84	27,00	66,00	
		GIII	30	55,23	9,54	22,00	65,00	
		GIV	28	59,46	7,12	33,00	65,00	
	PE	GI	26	1,12	2,20	0,00	11,00	0,001*
		GII	30	0,47	0,68	0,00	3,00	
		GIII	30	2,60	3,04	0,00	12,00	
		GIV	28	1,96	2,13	0,00	7,00	
	SP	GI	26	18,46	4,55	7,00	25,00	< 0,001*
		GII	30	21,60	5,78	9,00	28,00	
		GIII	30	24,20	3,57	14,00	29,00	
		GIV	28	25,43	3,85	16,00	29,00	
	WOLM	GI	26	14,77	4,94	5,00	22,00	< 0,001*
		GII	30	17,97	4,57	8,00	26,00	
		GIII	30	21,27	4,53	13,00	28,00	
		GIV	28	24,61	3,51	14,00	29,00	

Legend: LAW: letters of the alphabet writing, RDLA: randomized dictation of letters of the alphabet, WD: words dictation, NWD: nonwords dictation, PD: dictation with pictures, SD: sentences dictation, WPE: writing by purposeful error, SD: spelled dictation, WOLM: writing of words by orthography lexical memory.

Table 2 – Distribution of p-values refer to the comparasion of GI, GII, GIII e GIV

Test	Comparason inter-group					
	I x II	I x III	I x IV	II x III	II x IV	III x IV
LAW	0,020	< 0,001*	< 0,001*	0,066	0,042	0,783
RDLA	0,509	0,002*	0,226	< 0,001*	0,047	0,070
WD	< 0,001*	< 0,001*	< 0,001*	0,047	< 0,001*	< 0,001*
NWD	< 0,001*	< 0,001*	< 0,001*	0,012	0,005	0,477
PD	0,020	0,001*	< 0,001*	0,227	< 0,001*	0,007
SD	< 0,001*	< 0,001*	< 0,001*	0,211	0,001*	0,018
WPE	0,218	0,011	0,070	< 0,001*	0,002*	0,515
SD	0,007	< 0,001*	< 0,001*	0,120	0,002*	0,047
WOLM	0,018	< 0,001*	< 0,001*	0,009	< 0,001*	0,003*

Legend: LAW: letters of the alphabet writing, RDLA: randomized dictation of letters of the alphabet, WD: word dictation, NWD: nonword dictation, PD: dictation with pictures, SD: dictation of sentences, WPE: writing by purposeful error, SD: spelled dictation, WOLM: writing of words by orthography lexical memory.

phoneme-grapheme correspondence univocal (P/GC), errors by omission and addition of segments (OAS), improper junctions and separations at word (IJSW), errors grapheme-phoneme correspondence rules independent (P/GCIR), other findings (OF), omission of words (OP) and words addition in the sentence (WA), indicating that the average errors in each of these classifications have become less each subsequent series.

How were found statistically significant differences in tables 3, 4 and 5 when the groups were compared simultaneously on the classification based in the semiology of the errors, we applied the Mann-Whitney Test adjusted by Bonferroni Correction to determine which groups differed from the other . The table 6 describes the p values refer to comparison between groups on tests of words dictation, pictures dictation and dictation of sentences.

In the word dictation, students of GII, GIII and GIV showed superior performance to GI in relation to the errors of phoneme-grapheme correspondence univocal (P/GC), the same occurring with the errors of omission and addition of segments (OAS), with the errors of phoneme-grapheme correspondence depending of the phonetic context (P/GCDC) and with errors phoneme-grapheme correspondence rules independent (P/GCIR), and the students of the GIV showed less performance to GIII in the latter type of errors. The students of the GIV showed less performance for errors to absence or inadequate presence of accentuation (AIPA) in compared to GI and GII and in compared to GI as the errors in other findings (OF).

In the dictation with pictures, the results showed that the students of the GIV showed less perform to GI as error phoneme-grapheme correspondence

univocal (P/CG). The students of the GIII and GIV showed less performance to GI in relation to errors of omission and addition of segments (OAS). The students of the GII, GIII and GIV showed less performance to GI as errors of phoneme-grapheme correspondence rules independent (P/GCIR). The students of the GIII and GIV showed less performance to GII as other findings (OF).

In the dictation of sentences, the results showed that the students of the GIII and GIV showed less performance to GI as errors of phoneme-grapheme correspondence univocal (P/GC) and errors of omission and addition of segments (OAS), and for this last type of error, the less performance of the GIV also occurred in compared to GII. The students of the GIV showed results below to GI about the errors of improper junctions and separations at word (IJSW). The students of the GIII and GIV showed less performance to GI as errors of phoneme-grapheme correspondence independent rules (P/GCIR), this also occur in comparison to GIV and GII. The students of the GII, GIII and GIV showed less performance to GI and GIV in relation to GII as words omission in the sentence (WO). The students of the GIV showed less performance to GI about the errors of words adding in the sentence (WA).

Table 7 is described the relationship between the number of words produced (NPP) in writing thematic induced by pictures and classification of errors according to their semiology. After application of the Spearman Correlation Analysis, it is noted that occurred a positive correlation between the GI for the errors of phoneme-grapheme correspondence univocal (P/GC) and between GIV and errors of phoneme-grapheme correspondence rules independent (P/GICR) and errors to absence

Table 3 – Distribution of mean, standard deviation, maximum value, minimum value and and p-value for the performance of GI, GII, GIII and GIV in the test of word dictation on the classification of errors based on the semiology of errors

Semiology of errors	Gruop	N	Mean	Standard-deviation	Minimum	Maximum	p-value
P/GC	I	26	11,69	7,70	2,00	35,00	< 0,001*
	II	30	5,63	9,22	0,00	47,00	
	III	30	2,83	3,25	0,00	12,00	
	IV	28	2,11	3,99	0,00	21,00	
OAS	I	26	10,65	8,94	1,00	46,00	< 0,001*
	II	30	3,40	3,02	0,00	12,00	
	III	30	2,60	2,44	0,00	8,00	
	IV	28	1,39	2,62	0,00	14,00	
AOS	I	26	0,38	0,98	0,00	4,00	0,117
	II	30	0,23	0,82	0,00	4,00	
	III	30	0,27	0,64	0,00	2,00	
	IV	28	0,00	0,00	0,00	0,00	
IJSW	I	26	0,04	0,20	0,00	1,00	0,550
	II	30	0,00	0,00	0,00	0,00	
	III	30	0,03	0,18	0,00	1,00	
	IV	28	0,00	0,00	0,00	0,00	
P/GCDC	I	26	12,65	4,96	2,00	21,00	< 0,001*
	II	30	8,30	5,63	2,00	23,00	
	III	30	8,03	5,30	1,00	21,00	
	IV	28	4,64	4,05	0,00	15,00	
P/GCIR	I	26	25,88	7,57	2,00	37,00	< 0,001*
	II	30	16,07	6,38	3,00	29,00	
	III	30	11,17	6,22	1,00	26,00	
	IV	28	6,32	5,05	1,00	20,00	
AIPA	I	26	10,62	4,91	1,00	19,00	0,003*
	II	30	10,33	3,97	0,00	18,00	
	III	30	9,47	3,40	0,00	15,00	
	IV	28	6,18	4,69	0,00	15,00	
OF	I	26	1,88	4,53	0,00	21,00	0,001*
	II	30	0,43	1,52	0,00	6,00	
	III	30	0,20	0,48	0,00	2,00	
	IV	28	0,25	1,32	0,00	7,00	

Legend: P/GC: phoneme-grapheme correspondence univocal; OAS: omission and addition of segments; AOS: alteration in the order of the segments; IJSW: improper junctions and separation words; P/GCDC: phoneme-grapheme correspondence rules dependent of the phonetic context; P/GCIR: phoneme-grapheme correspondence rules independent; AIPA: absence or inadequate presence of accentuation; OF: other findings.

Table 4 – Distribution of mean, standard deviation, maximum value, minimum value and p-value for the performance of GI, GII, GIII and GIV in the test of dictation with pictures as the classification of errors based on the semiology of errors

Semiology of errors	Gruop	N	Mean	Standard-deviation	Minimum	Maximum	p-value
P/GC	I	26	2,77	3,00	0,00	14,00	0,001*
	II	30	1,60	2,44	0,00	11,00	
	III	30	1,00	1,02	0,00	4,00	
	IV	28	0,57	0,79	0,00	3,00	
OAS	I	26	2,54	2,50	0,00	13,00	< 0,001*
	II	30	1,30	1,42	0,00	6,00	
	III	30	0,80	1,00	0,00	4,00	
	IV	28	0,86	1,51	0,00	7,00	
AOS	I	26	0,23	0,99	0,00	5,00	0,176
	II	30	0,03	0,18	0,00	1,00	
	III	30	0,13	0,35	0,00	1,00	
	IV	28	0,00	0,00	0,00	0,00	
IJSW	I	26	0,38	1,06	0,00	5,00	0,001*
	II	30	0,00	0,00	0,00	0,00	
	III	30	0,00	0,00	0,00	0,00	
	IV	28	0,00	0,00	0,00	0,00	
P/GCDC	I	26	1,65	1,81	0,00	7,00	0,054
	II	30	0,63	0,85	0,00	3,00	
	III	30	1,20	1,45	0,00	5,00	
	IV	28	0,64	0,78	0,00	3,00	
P/GCIR	I	26	2,65	1,65	0,00	8,00	< 0,001*
	II	30	1,40	1,04	0,00	4,00	
	III	30	1,37	1,30	0,00	4,00	
	IV	28	0,68	0,95	0,00	3,00	
AIPA	I	26	2,65	1,65	0,00	8,00	0,036*
	II	30	1,40	1,04	0,00	4,00	
	III	30	1,37	1,30	0,00	4,00	
	IV	28	0,68	0,95	0,00	3,00	
OF	I	26	1,35	1,81	0,00	7,00	< 0,001*
	II	30	0,57	1,28	0,00	5,00	
	III	30	1,90	1,32	0,00	4,00	
	IV	28	1,89	1,55	0,00	5,00	

Legend: P/GC: phoneme-grapheme correspondence univocal; OAS: omission and addition of segments; AOS: alteration in the order of the segments; IJSW: improper junctions and separation words; P/GCDC: grapheme-phoneme correspondence depending of the phonetic context; P/GCIR: phoneme-grapheme correspondence independent of rules; AIPA: absence or inadequate presence of accentuation; OF: other findings.

Table 5 – Distribution of mean, standard deviation, maximum value, minimum value and p-value for the performance of GI, GII, GIII and GIV in the test of dictation of sentences about the classification of errors based on the semiology of errors

Semiology of errors	Gruop	n	Mean	Standard-deviation	Minimum	Maximum	p-value
P/GC	I	26	4,00	2,74	0,00	12,00	< 0,001*
	II	30	2,63	3,10	0,00	14,00	
	III	30	2,13	1,85	0,00	9,00	
	IV	28	1,39	2,08	0,00	11,00	
OAS	I	26	2,38	1,81	0,00	6,00	< 0,001*
	II	30	2,13	2,99	0,00	11,00	
	III	30	1,10	2,30	0,00	12,00	
	IV	28	0,46	1,90	0,00	10,00	
AOS	I	26	0,12	0,33	0,00	1,00	0,699
	II	30	0,10	0,31	0,00	1,00	
	III	30	0,07	0,25	0,00	1,00	
	IV	28	0,04	0,19	0,00	1,00	
IJSW	I	26	1,50	2,10	0,00	7,00	0,007*
	II	30	0,47	1,31	0,00	6,00	
	III	30	0,50	1,14	0,00	5,00	
	IV	28	0,11	0,32	0,00	1,00	
P/GCDC	I	26	1,54	1,86	0,00	7,00	0,082
	II	30	0,57	0,90	0,00	3,00	
	III	30	0,83	1,18	0,00	4,00	
	IV	28	0,57	1,03	0,00	4,00	
P/GCIR	I	26	5,08	2,64	0,00	11,00	< 0,001*
	II	30	3,37	2,40	0,00	11,00	
	III	30	2,03	2,44	0,00	8,00	
	IV	28	1,14	1,80	0,00	7,00	
AIPA	I	26	1,58	1,55	0,00	5,00	0,450
	II	30	1,50	1,17	0,00	4,00	
	III	30	1,97	1,43	0,00	7,00	
	IV	28	1,46	1,29	0,00	5,00	
OF	I	26	1,58	1,55	0,00	5,00	0,029*
	II	30	1,50	1,17	0,00	4,00	
	III	30	1,97	1,43	0,00	7,00	
	IV	28	1,46	1,29	0,00	5,00	
WO	I	26	6,96	9,20	0,00	45,00	< 0,001*
	II	30	2,43	3,90	0,00	16,00	
	III	30	1,40	2,69	0,00	14,00	
	IV	28	0,43	0,96	0,00	4,00	
WA	I	26	1,96	3,70	0,00	18,00	0,005*
	II	30	1,30	2,14	0,00	7,00	
	III	30	0,70	0,84	0,00	3,00	
	IV	28	0,21	0,57	0,00	2,00	

Legend: P/GC: phoneme-grapheme correspondence univocal; OAS: omission and addition of segments; AOS: alteration in the order of the segments; IJSW: improper junctions and separation words; P/GCDC: grapheme-phoneme correspondence depending of the phonetic context; P/GCIR: phoneme-grapheme correspondence independent of rules; AIPA: absence or inadequate presence of accentuation; OF: other findings, WO: word omission in sentence; WA: word addiction in sentence

Table 6 – Distribution of mean, standard deviation, maximum value, minimum value and p value for the performance of GI, GII, GIII and GIV

Semiology of errors	Comparison Inter-gruops					
	I x II	I x III	I x IV	II x III	II x IV	III x IV
P/GC_WD	< 0,001*	< 0,001*	< 0,001*	0,291	0,035	0,245
OAS_WD	< 0,001*	< 0,001*	< 0,001*	0,232	< 0,001*	0,010
P/GCDC_WD	0,002*	0,002*	< 0,001*	0,812	0,001*	0,004
P/GCIR_WD	< 0,001*	< 0,001*	< 0,001*	0,004	< 0,001*	0,001*
AIPA_WD	0,830	0,322	0,003*	0,480	0,002*	0,009
OF_WD	0,008	0,021	0,001*	0,523	0,366	0,122
P/GC_DP	0,024	0,004	< 0,001*	0,834	0,097	0,077
OAS_DP	0,008	< 0,001*	< 0,001*	0,153	0,078	0,670
IJSW_DP	0,013	0,013	0,016	1,000	1,000	1,000
P/GCIR_DP	0,001*	0,003*	< 0,001*	0,714	0,005	0,033
AIPA_DP	0,254	0,113	0,479	0,586	0,014	0,011
OF_DP	0,060	0,064	0,117	< 0,001*	< 0,001*	0,956
P/GC_DS	0,009	0,001*	< 0,001*	0,886	0,034	0,013
OAS_DS	0,157	0,001*	< 0,001*	0,224	0,001*	0,008
IJSW_DS	0,022	0,043	0,002*	0,727	0,299	0,163
P/GCIR_DS	0,005	< 0,001*	< 0,001*	0,013	< 0,001*	0,185
OF_DS	0,010	0,023	0,292	0,641	0,087	0,174
WO_DS	0,001*	< 0,001*	< 0,001*	0,384	0,003*	0,013
WA_DS	0,473	0,219	0,001*	0,706	0,004	0,006

Legend: P/GC: phoneme-grapheme correspondence univocal, OAS: omission and addition of segments; AOS: alteration in the order of the segments; IJSW: improper junctions and separation words; P/GCDC: grapheme-phoneme correspondence depending of the phonetic context; P/GCIR: phoneme-grapheme correspondence rules independent; AIPA: absence or inadequate presence of accentuation, OF: other findings; WO: word omission in sentence; WA: word addiction in sentence; WD: word dictation; DP: dictation with pictures; DS: dictation of sentences.

or inadequate presence of accentuation (AIPA), demonstrating that with increasing school ranking, there was also an increase of this type of error. Also was found negative correlation between the GII and the errors of phoneme-grapheme correspondence depending on the phonetic context (P/GCDC) and between the GI and other findings (OF), indicating that the increase in ranking, occurred a decrease this type of errors.

■ **DISCUSSION**

The results point to the fact of the students this study showed middle who became superior the each series subsequent in most tests of the collective version and individual of orthography evaluate, indicating that, with increasing school ranking, occurred greater knowledge about the use of spelling rules by the students, corroborating studies that point to the fact that the school in early process of appropriating the spelling system of the language have a higher

occurrence of spelling errors than those who are more advanced in their ranking[8,17-19].

In addition, the results also point to the fact that with increasing ranking, the students reduced the average errors in writing with based on the semiology of the error. This is because the children make "errors" of writing appropriation during learning until, gradually, they dominate more safely orthographic system [8,20,21].

However, this study found that the students of 3rd and 4th year showed a similar level of orthographic knowledge and close as the rules of the Portuguese of Brazil, and higher level of orthographic knowledge compared with students of the 2nd year, showing that from the 3rd school year may have been a greater emphasis on spelling instruction on the rule and use, making this performance profile occur in the comparison groups.

This can be explained by the acquisition spelling, or as is also called, appropriation of writing, because it is an evolutionary process, in which the learner produces hypotheses about what is written, which

Table 7 – Correlation between the classification of errors to their semiology of errors and the number of words produced (NPP) during the production of thematic writing induced by pictures of GI, GII, GIII, GIV

Semiology of errors	Statistically	NPP			
		G I	G II	G III	G IV
P/GC	Correlation Coefficient (r)	+0,228	+0,061	+0,021	+0,527
	Significance (p)	0,263	0,748	,912	0,004*
	n	26	30	30	28
OAS	Correlation Coefficient (r)	-0,055	+0,093	+0,119	+0,331
	Significance (p)	0,789	0,624	0,532	0,085
	n	26	30	30	28
AOS	Correlation Coefficient (r)	—	-0,131	-0,215	-0,163
	Significance (p)	—	0,489	0,255	0,407
	N	26	30	30	28
IJSW	Correlation Coefficient (r)	-0,194	-0,067	-0,024	+0,222
	Significance (p)	0,343	0,723	0,898	0,255
	N	26	30	30	28
P/GCDC	Correlation Coefficeint (r)	+0,284	-0,394	+0,114	+0,211
	Significance (p)	0,159	0,031*	0,549	0,282
	N	26	30	30	28
P/GCIR	Correlation Coefficient (r)	+0,541	-0,073	+0,246	+0,250
	Significance (p)	0,004*	0,700	0,189	0,200
	N	26	30	30	28
AIPA	Correlation Coefficient (r)	+0,107	+0,293	+0,261	+0,576
	Significance (p)	0,602	0,116	0,163	0,001*
	N	26	30	30	28
OF	Correlation Coefficient (r)	-0,412	+0,046	-0,107	-0,153
	Significance (p)	0,036*	0,808	0,573	0,437
	N	26	30	30	28

Legend: P/GC: phoneme-grapheme correspondence univocal; OAS: omission and addition of segments; AOS: alteration in the order of the segments; IJSW: improper junctions and separation words; P/GCDC: grapheme-phoneme correspondence depending of the phonetic context; P/GCIR: phoneme-grapheme correspondence independent of rules; AIPA: absence or inadequate presence of accentuation; OF: other findings.

show different degrees of knowledge that are being built up, which means that no one learns to write immediately and that "errors" are implicit in this process[11,18,22].

Regarding the classification of errors based on their semiology, it was observed in this study that occurred a greater frequency of errors that affect the natural orthography, rather than the arbitrary orthography, which was not expected, because to write it should be spelled overcome alphabetical phase, linked to natural orthography, this indicates that it cannot be happening formal instruction about phoneme-grapheme correspondence, since they are directly dependent on the learning of the rule of phoneme-grapheme direct correspondence. This instruction is necessary for learning the writing

system with alphabetical based, as the Portuguese, as pointed out in the national literature[23-27].

As for the orthography errors natural were found in the population of this study: errors of phoneme-grapheme correspondence univocal (CF/G), omission and addition of segments (OAS), separation and joining undue in the word (SJIP), and as for errors arbitrary orthography: errors of grapheme-phoneme correspondence depending of the phonetic context (CF/GDC) and errors of phoneme-grapheme correspondence independent of rules (CF/GIR). In addition, occurred errors by absence or presence inadequate presence of accentuation (APIA) and other findings (OA), such as writing letters illegible or writing of invented words that do not belong to the original classification used in this study.

The average errors based on their semiology found in this study became less with each subsequent series. The decrease of the types of errors along the ranking can be considered mark of the acquisition of orthographic writing system of the Portuguese, pointing to a normal development of writing for children, as described in the literature[2].

The decrease of the average of errors to the classification other findings (OA) shows that with increasing ranking school, students in this study were to acquire the orthography of Portuguese in Brazil, because the average error has been decreasing along the ranking, making with that the students of the more advanced years would stop writing invented words and illegible and started to write words using the mechanism phoneme-grapheme conversion.

The association of these findings is consistent with what is described in the national literature[2,8] and international[1,3,9,13], which states that both the orthographic and phonological processes are important to the learning of writing, as patterns of grapheme-phoneme conversion can be learned through increased exposure the frequency of occurrence and the use of ratings orthographic.

However, it leads to a reflection on the occurrence of the lack of formal instruction of the conversion mechanism phoneme-grapheme needed in early literacy to students in this study.

Also with regard to the aspect of literacy, it is emphasized that this study found an type of error classified as error by absence or inadequate presence of accentuation (APIA). This was a significant data of this study, found in the writing analysis thematic induced by pictures, because with the increased production of the number of words due to the increased use and exposure to writing throughout the school ranking, there was also increased in this errors by absence or inadequate presence of accentuation (APIA), because the accentuation is considered a complex orthographic rule, which requires knowledge of the type last, penultimate and antepenultimate syllable tônica and átona, syllable separation orthographic and classification in oxítona, paroxytone and proparoxítona[28], demonstrating a lack of instruction formal in context of the classroom to those aspects of orthography.

These results, together with others, corroborate literature, reveals that many students in early phase of literacy may show changes in writing because the school does not emphasize the teaching of orthography by the weak theoretical basis and practice of their teachers[2,22-27,29-30].

The findings in this population point to the need for further study with other school populations, for the purpose of establish the profile acquisition and orthographic development of students in early literacy, because only this way you can identify which the appropriate errors the appropriation of the writing system in each school ranking, so you can differentiate them from those orthographic errors that are persistent and may feature a picture of dysorthographia, associated with dyslexia or learning disorder.

■ CONCLUSION

The results of this study revealed that comparing the performance of students of the 2nd to 5th year there was an increase in batting average in all tests for version collective and individual of the Pro-Orthography, indicating that with increasing ranking school, there was a greater mastery of orthographic knowledge by school this study, which may be indicative of normal development of writing child in this population.

Regarding the classification of errors based on the semiology, the results of this study showed that the groups decreased the average error in writing, however, showed higher frequency of errors that affect the natural orthography, rather than the arbitrary, indicating that cannot be occurring formal instruction about the phoneme-grapheme correspondence, since they are directly dependent of the learning of the rule direct phoneme-grapheme correspondence.

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RESUMO

Objetivos: caracterizar, comparar e classificar o desempenho dos escolares do 2º ao 5º ano do ensino particular segundo a semiologia dos erros. **Método:** foram avaliados 115 escolares do 2º ao 5º ano, sendo 27 do 2°ano, 30 do 3° e 4° ano e 28 do 5° ano escolar, divididos em quatro grupos, respectivamente GI, GII, GIII e GIV. As provas do protocolo de avaliação da ortografia – Pró-Ortografia foram divididas em: versão coletiva (escrita de letras do alfabeto, ditado randomizado das letras do alfabeto, ditado de palavras, ditado de pseudopalavras, ditado com figuras, escrita temática induzida por figura) e versão individual (ditado de frases, erro proposital, ditado soletrado, memória lexical ortográfica). **Resultados:** houve diferença estatisticamente significante na comparação intergrupos, indicando que com o aumento da média de acertos em todas as provas da versão coletiva e individual e com o aumento da seriação escolar, os grupos diminuíram a média de erros na escrita com base na semiologia do erro. A maior freqüência de erros encontrada foi de ortografia natural. **Conclusão:** os dados deste estudo evidenciaram que o aumento da média de acertos de acordo com a seriação escolar pode ser indicativo do funcionamento normal de desenvolvimento da escrita infantil nesta população. A maior frequência de erros de ortografia natural encontrada indica que pode não estar ocorrendo instrução formal sobre a correspondência fonema-grafema, uma vez que os mesmos estão na dependência direta da aprendizagem da regra de correspondência direta fonema-grafema.

DESCRITORES: Avaliação; Escrita Manual; Aprendizagem; Educação; Escolaridade

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