

International Journal of Human Sciences Research

RELATIONSHIP BETWEEN READING FLUENCE AND SPELLING

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Abstract: The teaching of reading aims at the formation of competent readers and, consequently, the formation of writers capable of written communication. This study aimed to verify the relationship between reading fluency and the production of spelling errors. That is, to verify whether subjects with better reading fluency also perform better in spelling. First, a review of the literature on the subject was carried out and, later, an empirical study was carried out with 20 children (10 students from the 3rd year and 10 from the 4th year of schooling) who were submitted to reading and dictation measurement tests. In general terms, it was found that there is a positive relationship between reading fluency and the production of spelling errors.

Keywords: Reading, spelling, fluency, errors, categorization.

LITERATURE REVIEW

THE ALPHABETIC PRINCIPLE, PHONOLOGICAL AWARENESS AND ALPHABETIC WRITING

In an alphabetic writing language such as Portuguese, written words are formed by letters that are associated with phonic segments [sounds] of orality. The correspondence between the number of sounds in the language and the number of letters in the alphabet corresponds to the alphabetic principle. Its discovery and consolidation are essential in learning to read deciphering, which consists of learning to relate the sounds of the Portuguese language with the letters that represent them (PNEP, 2009). Several factors, according to the same author, can determine the greater or lesser ease in accessing the alphabetic principle, namely the child's sociocultural environment, their contact with books and writing in general, the characteristics of the writing system they have. to learn and the degree of phonological awareness.

To learn to read and write, the child will have to develop phonological awareness which is the ability to pay attention, identify, manipulate and segment the speech chain, the speech sounds). Lopes, M. C. S. (2010) citing Viana and Teixeira (2002), reinforces the idea by arguing that in order to learn to read, the child needs to understand that language is made up of sentences, which are broken down into words that, in turn, break down into smaller units. Alphabetical writings do not faithfully represent reality, they try to represent, more or less faithfully, the sounds of speech. In Portuguese there is not always a direct correspondence between sounds and graphemes, a sound may not always be represented by the same grapheme and a grapheme may not always represent the same sound. For this reason, the task of writing is more demanding than the task of reading, since the representation of the sounds of a word through graphemes, writing, is less transparent than the task of converting it into phonemes, reading, (PNEP, 2011). The same is defended by Callou, D. and Leite, Y. (2009), when they mention that in the Portuguese writing system, the same sound can be represented by several letters or the same letter can represent several sounds, eg., two graphemes (digraphs) can represent a phoneme, as is the case with rr, ss, ch, etc. A given linguistic system is considered more opaque or more transparent, depending on the existence of a lesser or greater correspondence between spelling and sound. "The more transparent or regular a linguistic system is, the more easily its orthographic mastery will be achieved" (Reis, A. S., 2016, p.16).

READING, DECODING, DECIPHERING AND FLUENCY

The activity of reading, as has been duly proven, is very complex, which implies a series of mental operations, including the ability to

decode, since reading means decoding the linguistic signs that make up written language (Oliveira, N. B., 2015). Decoding consists of the ability to recognize letters or graphic symbols and translate them into oral language (Defior Citoler, 1996 cit. in Lopes, M. C. S., 2010). The deciphering of the reading allows the reader to perform it through several steps, in which, in addition to decoding, he must understand all the information in that same text (Stampa, 2009 cit. in Oliveira, N. B., 2015). Thus, reading “is seen as a product of decoding and understanding [deciphering], and one of the components, when restricted, limits the reach of the other” (Oliveira, A. et al, 2009 p.285). It is also important to mention reading fluency which, according to Meyer and Felton (1999), is defined as “the ability to read texts quickly, smoothly, effortlessly and automatically, paying little attention to reading mechanisms, namely decoding” (cit. in Oliveira, A. et al 2009 p.286). According to the authors, fluency develops over time and with the reader’s experience, and may vary with the familiarity of the words.

According to Sally Shaywitz (2008) almost as important as working on reading fluency is measuring it, in order to be able to evaluate and compare it. According to the author, a first year student must ideally read between 40 and 60 words per minute, a second year student must read between 80 and 100 words per minute, a third year student must read between 100 and 120 words per minute and a fourth grader and above must read between 120 and 180 words per minute.

READING AND SPELLING

The acquisition of written code - reading and writing - and, as already mentioned, is a difficult and complex activity that involves several phases until the process is complete. It thus involves a “broad set of knowledge and a multiplicity of cognitive processes” (Lopes, M.

C. S., 2010 p.154). Learning to write involves memorizing the graphic forms of words, especially those whose spelling can generate doubts due to irregular characteristics. For this reason, during the literacy process, emphasis is placed on copying and reading texts in order to work on the memorization of correspondences between letters and sounds (Zorzi, J. L.; Serapompa, M. T.; Faria, A. T. & Oliveira, P. S, 2003). Against this principle, Ehri, L. C. (2000), mentions studies that claim that readers retain specific information about words in memory that they later use to write them. In this sense, according to the author, activities that contribute to improving students’ knowledge of the alphabetic system through reading will benefit their orthographic ability. Also Zorzi, J.L. et al. (2003), through a study with 268 elementary school children in Brazil, defend that spelling correction depends on the experience that the individual has as a reader. The “continuous and systematic” contact with written words through reading can have a favorable effect on knowing how to write them (p.9). The authors also argue that there will be a reciprocal relationship between reading and writing, because “the more you read, the better you write, and the more you write, the better you read” (Kato, 1985 p.2). The same affirms Ehri, L. C. (2000), when referring that reading and writing words, “are two sides of a coin” (p.33). However, they are not exactly the same, as the act of reading involves the retrieval and pronunciation of words and the act of writing several letters in the correct sequence involves several processes for remembering the spelling of words. Therefore, and although these processes are closely related, the acquisition of spelling skills must not be left to reading instruction and practice alone, because the memory requirements for writing words exceed the memory requirements for reading

accurately. "People need more information in memory to spell words accurately than to read words" (p.33).

DYSORTOGRAPHY AND SPELLING ERRORS

As a result of writing, spelling or spelling errors often occur "which generally reflect a lack of correspondence between the phoneme system and the grapheme system" (Callou, D. & Leite, Y., 2009, p.113).). Dysortography is the set of spelling errors that affect the word and not its stroke or spelling. "Disortografia implies a series of systematic and repeated errors in writing and spelling" (Torres, R. M.R. & Fernández, P. F., 2000 p.105). On the other hand, the spelling error is defined by Miranda, A. R. M. (2010), as: "I - false judgment, mistake, mistake; II - inaccuracy, inaccuracy; III - deviation from the right path, disorder, lack" (p.3 -4) The idea of error is often associated with a derogatory value, however when it occurs in the learning process, the error can show that learning is happening. In line with this thought, Pinto (1998) argues that the error Thus, the spelling plays two roles: one related to the notion of failure, taking into account the established orthographic norm, the other related to the way in which the child builds his learning from the knowledge he already has, allowing us to accompany this development process. This author considers the error as a normal and necessary occurrence for progression in the teaching/learning process that contributes to the acquisition and consolidation of new learning (cit. in Graça, F. & Osório, P., 2011). you students will be able to participate in the construction of knowledge, improving writing, as orthography is formed by a set of norms recognized by society, whose application implies mechanisms of a mental and motor nature (Fernandes, V. H. P. M., 2008). In the same sense, Lopes, F.T.F. (2011),

argues that in the teaching/learning process of spelling, spelling errors allow us to understand the representations that children have about spelling, and must be seen not as a deficit of a norm, but rather as an intellectual process that can lead to children to reflect on the reasons behind their origin.

ETIOLOGY OF SPELLING ERRORS AND DYSORTHOGRAPHY

To list the causes of spelling errors in school-age children implies considering a wide range of aspects that may arise from a deficient teaching/learning process motivated by inadequate teacher training (Graça, F. & Osório, P., 2011). Other authors, however, defend other causes for the occurrence of errors. In the opinion of Mateus M. (2002) cited by the same authors, the senses such as vision and hearing can also influence the correct learning of the language, as they can constitute obstacles. The author also defends other factors such as the influence of the child's family and social environment, the overload of programs, regionalism and psychomotricity. This author emphasizes the influence that the teacher can exert when faced with a dictation, due to the way he says it, how he syllables, how he intones or how he punctuates. Silveira (2006), reiterates that the causes of spelling errors can be very varied, being due to factors related to teaching methods, difficulties in the language itself, psychological causes and also the influence of the student's sociocultural environment (cit. in Silva, A.S.A., 2015). According to Torres, R. M. R. and Fernández, P. F. (2000), the following can be cited as fundamental causes of dysorthography: spatio-temporal level; ii) Causes of an intellectual nature, related to intellectual deficit or immaturity; iii) Causes of a linguistic type that include language problems (difficulties in articulation); iv) Affective-emotional causes, related to a low

level of motivation; v) Pedagogical causes, in which inappropriate pedagogies often appear as a key factor in the etiology of writing difficulties.

CLASSIFICATION OF SPELLING ERRORS

In the treatment of spelling errors, there are no single and effective models that can be taken as ideal (Graça, F. & Osório, P., 2011). Also Pinto (1998), cited in Silva, A. S. A. (2015), highlights the difficulty that sometimes represents classifying errors by categories, because in certain situations, some words may belong to more than one category of error. As a result of this investigation, it can be said that many authors carry out and participate in studies on spelling errors and there are many proposals for their categorization. Sousa (1999) proposes a typology of errors grouped into three categories: I – phonetically and graphically incorrect words, errors of addition, omission, substitution, change of position or inversion. In errors by changing position or inversion, the word has all the graphemes, but placed in an incorrect order; II – phonetically correct words, but graphically incorrect. These errors are the result of the univocal mismatch between phoneme and grapheme, substitution of upper/lowercase, homophone spellings, omission/addition of sounds; III – others caused by the loss of the auditory signal, affecting the word as a whole, making it unrecognizable, omitted or being replaced by another (cit. in Graça, F. & Osório, P., 2011). Barbeiro (2007) reveals another categorization of errors, grouping them into nine categories: 1 - Inaccuracies due to transcription failures between the phonological system and the orthographic system; 2 - Inaccuracies due to orality transcription, that is, due to the transcription of varieties and records that differ from their representation in the established orthographic standard (eg: water

auga); 3 - Inaccuracies due to non-observance of phonologically based orthographic rules; 4 - Inaccuracies due to non-observance of morphological basis rules (eg: cat for cat, study for study); 5 - Inaccuracies regarding the specific orthographic form of the word – lexical criterion (eg: cino for bell, caicha for box); 6 - Inaccuracies in accentuation (eg: water for water, á for à); 7 - Incorrect use of lower and upper case letters (namely the use of capital letters at the beginning of the period); 8 - Inaccuracies due to non-observance of the graphic unit of the word, linked to the junction of words (ex: seirem por se iriam) and the separation of elements of a word (ex: porisso - therefore, suddenly por suddenly) and also the use of a hyphen; 9 - Wrapping errors (eg: turistas by tu-ris-tas). The categorization of errors proposed by Torres, R. M. R. and Fernández, P. F. (2000), presented in table 1, will serve for the analysis of the written productions that I will evaluate in this study.

METHOD GOALS

In order to find some answers to a problem that is very present in the writing learning process, spelling errors in the first cycle, we proposed:- Measure reading fluency in two groups of 3rd and 4th grade students based on the table Sally Shaywitz (2008);

– Identify the types of spelling errors in two groups of 3rd and 4th grade students based on the error classification table proposed by Torres, R. M. R. and Fernández, P. F. (2000); Compare the type of spelling errors in 3rd year students with good and poor reading fluency; – Compare the type of spelling errors in 4th year students with good and poor reading fluency; Compare the type of errors of 3rd and 4th year students with good reading fluency; Compare the type of errors of 3rd and 4th year students with poor reading fluency; To verify the relationship

Categories	Description
<p>Linguistic-perceptive errors</p> <p>This type of error is characteristic of the so-called “natural spelling”, which the child must acquire during the first cycle of basic education, and these errors are more frequent in these early years.</p>	<p>Replacement of related vowel or consonant phonemes by the point and/or mode of articulation (f/z/t/d/b)</p> <p>Omission of phonemes, usually consonant, in implosive position (as per chromo)</p> <p>Omission of whole syllables (car per letter). omission of words</p> <p>Addition of phonemes, due to insufficiency or exaggeration of the word analysis (tarate by tarte)</p> <p>Adding whole syllables adding words</p> <p>Inversion of graphemes within syllables (aldo per side close to black)</p> <p>Inversion of syllables in the word word inversion</p>
<p>Visual and spatial errors</p> <p>The last three errors are included in the so-called “visual spelling” and derive from orthographic peculiarities, the learning of which largely depends on visual memory.</p>	<p>Replacement of letters that differ by their position in space (d/p, p/q)</p> <p>Substitution of similar letters for their visual characteristics (m/n, o/a, l/e)</p> <p>Writing words or phrases in mirror</p> <p>Confusion of words with phonemes that admit double spelling (c/q, s/z)</p> <p>Confusion with phonemes that admit two spellings, depending on the vowels (c, g.)</p> <p>Omission of the letter h for not having a phonetic correspondence.</p>
<p>Visual and auditory errors</p>	<p>Exchange of one letter for another meaningless, due to difficulty in performing the synthesis and association between phoneme and grapheme.</p>
<p>Content errors</p> <p>Difficulty separating graphic sequences using the corresponding blanks:</p>	<p>Word union (suddenly)</p> <p>Hyphenation that makes up a word (es-ta)</p> <p>Union of syllables belonging to two words (near)</p>
<p>Errors regarding spelling rules</p>	<p>Do not write “m” before “p” or “b” or at the end of words</p> <p>Breaking scoring rules</p> <p>Do not respect capitalization after a period or at the beginning of words</p> <p>Write with «ão» verbs that end in «am» or vice versa.</p>

Table 1 - Categorization of Spelling Errors

Adapted from Torres, R. M. R. e Fernández, P. F. (2000)

between reading fluency and the production of spelling errors.

PARTICIPANTS

Two groups were part of this study: 10 students from the 3rd year and 10 students from the 4th year of schooling. These groups included 5 students with good performance in reading and 5 students with poor performance in reading, indicated by the respective head teachers.

INSTRUMENTS AND PROCEDURES

This research used an excerpt from the book “*A girafa que comia estrelas*” by José Eduardo Agualusa for the measurement of reading through a reading measuring device. For the dictation test, two texts by Luísa Ducla Soares were used, one for the third and one for the fourth year of schooling, as well as a list of 20 words. The classification table of spelling errors proposed by Torres, R. M. R. and Fernández, P. F. (2000) was also used, with a slight adaptation to the Portuguese orthography.

At first, the selected texts were dictated to the students by the head teacher of the class, taking into account the articulation, intonation and punctuation. In a second moment, the list of 20 words was dictated to these same students, without them realizing that they were being evaluated. These two instruments included words that guaranteed the presence of possible spelling difficulties. Finally, the reading measurement was carried out through the reading meter that counts the number of words read per minute, for later comparison with the table of Sally Shaywitz (2008).

RESULTS

The 3rd year students considered to have good reading fluency had a reading time between 1.05 and 1.42 minutes, with the

average time reached by this group being 1 minute and 25 seconds ($m=1.15$; $dp=0.18$). In turn, students considered to have poor reading fluency scored between 2.06 and 2.53 and, consequently, showed a substantially higher average time ($m=2.35$; $dp=0.20$). The same trend is observed in the 4th grade group. The average time taken by students with good reading fluency is 1.07 minutes ($sd=0.04$, $minimum=1.02$; $maximum=1.13$), and students with poor reading skills took an average of 2.46 minutes. minutes to read the proposed text ($sd=1.07$; $minimum=1.52$, $maximum=4.27$). Regarding the number of words they must read per minute, it appears that 3rd year students with good reading skills read between 118 and 138 words per minute, and on average must read approximately 128 words/minute ($m=127.80$; $sd=7.63$), while students with poor reading ability only present the range of 32-77 words/minute, with an average of about 61 words ($m=60.80$; $sd=18.01$). Regarding the type of spelling errors, in the 3rd year group, the most prominent errors in students with good reading fluency are the errors of “Confusion of words with phonemes that admit double spelling (c/q, s/z)” ($m=4.40$; $dp=2.79$), followed by the errors of “Omission of phonemes, usually consonant, in implosive position (as per chromium)” ($m=260$; $dp=1.52$) and the errors of “Exchange of one letter for another meaningless, due to difficulty in performing the synthesis and association between phonemes and graphemes” ($m=1.00$; $dp=1.00$). In the group of students with poor reading fluency, it is exactly in these error categories, and in the same order, that the highest averages appear, but it is verified that the values are substantially higher ($m=9.80$; $dp=2.49$ / $m=6.00$; $dp=2.74$ and $m=2.60$; $dp=3.44$ respectively). In this group, the category of errors of “Do not write «m» before «p» or

«b» or at the end of words stands out, with an average of 2.20 errors (sd=1.79). In the group of students with good reading competence in the 4th year, only one category of errors stands out, more specifically in the “Confusion of words with phonemes that admit double spelling (c/q, s/z)”, in which they obtained approximately 3 errors (m=2.50; dp=1.67). In the other categories, the values observed are low, not reaching an error per element, or there are no errors. In the group with poor reading fluency, the results are quite different. The averages are much higher compared to colleagues, and the errors of “Confusion of words with phonemes that admit double spelling (c/q, s/z)” (m=7.40; sd=4.98) are also highlighted.), the category of errors of “Omission of phonemes, usually consonant, in implosive position (as per chromo)” (m=5.40; dp=4.16), of “Omission of the letter “h” for not having a correspondence phonetics” (m=3.40; dp=3.13), from “Do not write «m» before «p» or «b» or at the end of words” (m=3.20; dp=1, 48), and the category of errors of “Replacement of vowel or consonant phonemes related by the point and/or mode of articulation (f/z/ t/d/b)” (m=2.40; dp=1.82). Thus, in the 3rd year group, it was found that, in general, students with poor reading fluency present a greater number of spelling errors in all error categories, with the difference being even more visible through the averages of the total errors (m= 11.80; dp=8.20 in students with good reading competence and m=21.00; dp=7.71 in students with poor reading fluency). It is also confirmed that the most common spelling errors in all students are visual and spatial errors (m=5.60; sd=3.97 and m=12.60; sd=3.51), and errors of linguistic-perceptive character (m=3.40; sd=2.30 and m=8.60; sd=4.45 respectively). In the group of students with poor reading ability, the number of Errors referring to

spelling rules is still outstanding (m=4.00; dp=1.41). Content errors (m=0.20 and m=0.40) are less common.

In 4th year students, the differences are even more evident and significant. Overall, students with good reading fluency have an average of approximately 4 spelling errors (m=3.80; dp=1.79), and students with poor reading fluency exhibit an average of about 27 errors (m=26.80; dp=12.56). It is also noteworthy that in the group of students with good reading fluency, most errors occur in the category of Visual and spatial errors (m=2.80; dp=1.30), and in the other categories the number of errors is small. Likewise, in students with poor reading skills, the errors found are visual and spatial errors (m=12.00; dp=5.70), but in these elements, linguistic-perceptive errors are equally frequent (m=9.80; dp=6.83) and Errors referring to spelling rules (m=3.40; dp=1.14). year with good reading fluency had, on average, more spelling errors than the 4th year counterparts (m=11.80; sd=8.20 and m=3.80; sd=1.79 respectively), the difference being quite significant. On the other hand, in students with poor reading ability, the difference in the general average is practically absent (m=27.00; sd=7.71 and m=26.80; sd=12.56 respectively). Also in the error categories, the difference is small, highlighting only that 4th year students tend to make more linguistic-perceptive errors than 3rd year students (m=8.60; sd=4.45 and m =9.80; dp=6.83 respectively).

DISCUSSION

It is verified through this study that the vast majority of 3rd year students considered to have good reading fluency are below expectations in terms of the number of words read per minute when compared to 4th year students, which is in line with what refer Oliveira, A. et al. (2009) when mentioning that reading fluency develops over time and

with the reader's experience. With regard to the production of spelling errors, taking into account the classification table of errors proposed by Torres, R. M. R. and Fernández, P. F. (2000), it can be seen that in the 3rd year, both students with good reading fluency and students with poor fluency, they register many spelling errors, the most frequent errors being the errors of "Confusion of words with phonemes that admit double spelling", "Omission of phonemes" and errors of "Exchange of one letter for another meaningless". However, the values are higher in the group of students with poor reading fluency. This is in line with the fact that in our language, there is not always a direct correspondence between sounds and graphemes, and a sound may not always be represented by the same grapheme and a grapheme may not always represent the same sound (PNEP, 2011). The same letter can represent several sounds, eg., two graphemes (digraphs) can represent a phoneme, as is the case with rr, ss, ch etc. (Callou, D. & Leite, Y., 2009). On the other hand, it appears that in the 4th year students with good reading fluency, the occurrence of errors was quite small. Thus, according to Sousa, O. and Vale, A. P. (2017), writing and reading words share mental representations, cognitive mechanisms and sources of information, since good readers tend to be good writers and vice versa. Against this principle, Ehri, L. C. (2000), mentions that readers retain in memory specific information of words that they later use to write them. In students with poor reading fluency (4th grade), the number of errors was much higher, also including the categories "Confusion of words with phonemes that admit double spelling", "Omission of phonemes", errors of "Exchange of a letter for another meaningless" and "Omission of the letter "h" for not having a phonetic correspondence. In this sense,

according to Ehri, L. C. (2000), activities that contribute to improving students' knowledge of the alphabetic system through reading will benefit their orthographic ability. Therefore, during the literacy process, it is sought to privilege activities of copying and reading texts with the objective of working on the memorization of correspondences between letters and sounds, especially those whose spelling can generate doubts due to irregularity characteristics. (Zorzi, J.L. et al., 2003). It was also found that, in general, both 3rd and 4th year students with poor reading fluency have a greater number of spelling errors in all error categories, compared to students with good fluency. According to Ehri and Perfetti (1997), reading and writing are closely intertwined and share cognitive resources, knowledge about the functioning of the alphabetic system and knowledge about the spelling of words (cited in Lopes, F.T.F., 2011). Readers retain specific word information in memory that they later use to write them (Ehri, L. C., 2000). Comparing the results now by year of schooling, it appears that 3rd year students with good reading fluency made, on average, more spelling errors than 4th year students, the difference being quite significant. Zorzi, J. L. et al (2003), state that "reading is not the only variable to guarantee spelling knowledge", there may be other important factors such as spelling exercises or reflection on writing by the child that contribute to the spell correction. Therefore, and although these processes are closely related, the acquisition of spelling skills must not be left to reading instruction and practice alone, because the memory requirements for writing words exceed the memory requirements for reading accurately (Ehri, L.C., 2000).

It must also be noted that in the 3rd year, three of the five students indicated as "good readers" by the head teacher of the

class are below expectations in terms of the number of words read per minute and also made a high number of spelling errors. This situation may be due to the fact that these students were in the 1st year of schooling when there was mandatory confinement due to the pandemic and had distance learning for practically two years, which may not have benefited the reading acquisition process / writing. According to Torres, R. M. R. and Fernández, P. F. (2000), pedagogical causes with inappropriate pedagogies in which the teaching method may be inappropriate because it uses harmful techniques or because it does not adjust to the individual needs of the student are frequently pointed out. as a key factor in the etiology of writing difficulties. On the other hand, in students with poor reading fluency, both in the 3rd and 4th grades, it appears that they made

a high number of spelling errors. The difference in the general average of errors committed is practically non-existent, as well as in the error categories. Veloso (2003), cited in Lopes, F. T. F. (2011), considers that the child's written productions [with spelling errors] reveal the still unconsolidated knowledge of all normative orthographic conventions. These productions reveal, on the one hand, the assimilation of certain basic principles of alphabetic writing, on the other hand, the lack of knowledge of aspects not yet taught/learned of the orthographic standard. This way, it can be verified through this study that there is a relationship between reading fluency and spelling performance, and students with better fluency made fewer spelling errors than students with poor fluency.

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