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READING COMPETENCE AND PHONOLOGICAL DEVELOPMENT: ANALYSIS OF PERFORMANCE IN WORDS AND PSEUDOWORDS AMONG SCHOOLCHILDREN FROM AMAPA

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ABSTRACT

This study evaluated the reading competence of words and pseudowords in 290 elementary school students from a public school in Macapá, using the Test of Reading Competence for Words and Pseudowords (TCLPP). The research analyzed the performance of participants in different reading categories, such as regular and irregular words and pseudowords, considering the variables gender, age and school year. Through descriptive and inferential analyses, Student's t-test and ANOVA were applied, followed by Tukey's test to identify groups with significant differences in the means. The results revealed that age and school progression positively influence student performance. However, more complex categories, such as homophone pseudowords and those with phonological changes, presented greater difficulty, suggesting challenges in the use of phonological and lexical routes. The study highlights the importance of pedagogical interventions to improve both phonological and lexical routes, especially in the early school years. Limitations include the localized sample and the lack of analysis of external factors, such as emotional and social aspects. Despite this, the findings reinforce the need for targeted educational strategies, promoting more fluent and comprehensive reading to improve literacy skills. The findings reinforce the importance of pedagogical interventions that develop both the phonological and lexical pathways, especially in the early school years. The study provides support for the formulation of more effective educational strategies, aimed at improving reading and writing skills. Future research with larger and more diverse samples is recommended to deepen the understanding of the development of reading skills throughout the literacy process.

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INTRODUCTION

Reading comprehension is a dynamic and profound process that begins when the reader encounters a text and develops as different cognitive skills are activated. Reading and understanding goes beyond simply recognizing words: it involves processing, storing and retrieving information, in addition to mobilizing memory, attention, logical reasoning and auditory and visual abilities (Butterfuss; Kim and Kendeou, 2020; Cao and Kim, 2021; Talwar, 2021; Capin, et al.; 2022; Bishara, 2024).

These skills interact with essential reading processes, such as decoding – that is, the ability to transform written words into sounds and meanings. However, decoding is only a starting point, as truly understanding a text means being able to practically and consciously use the information contained in it in future situations (Srisang and Everatt, 2021).

This is why reading comprehension plays an essential role in literacy, acting as a foundation for learning in various areas of knowledge. It not only facilitates learning, but also promotes autonomy, allowing the individual to make connections, solve problems and expand their intellectual repertoire through reading (Clemens.; et al, 2021).

The learning process is unique for each person, as it depends on several factors, such as brain development and the environment in which the child lives. Although each learning trajectory is particular, there are some fundamental skills for this process to happen efficiently. In the school context, achieving good performance is directly linked to the development of essential skills, such as writing, reading and mathematical reasoning. These skills not only support academic progress, but also prepare the child to deal with the challenges of everyday life in a more autonomous and confident way (Silva, 2005).

In the literacy process, reading competence develops gradually through different stages: logographic, alphabetic and orthographic. Each of these stages involves the use of specific strategies, such as logographic, phonological and lexical, which help in the construction of reading skills (Çağan, 2024).

To assess this development, the present study uses the Word and Pseudoword Reading Competence Test (TCLPP). This instrument was chosen for its ability to measure the evolution of reading throughout the three stages – from initial visual recognition at the logographic level, through the association between sound and letter at the alphabetic stage, to the consolidation of more complex spelling rules (Souza, Escarce and Lemos, 2019; Capovilla, Varanda and Capovilla, 2024).

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The assessment of word and pseudoword reading is justified by the importance of investigating different processing strategies in reading. The phonological route, or phonological strategy, is especially analyzed through the ability to read pseudowords, while the lexical route, or lexical strategy, is assessed by the reading of irregular words. Studies also indicate that performance in reading tasks tends to improve with age and education. This is because, throughout the school years, children gain more experience with reading and expand their lexical knowledge and phoneme combination rules. As a result, both reading routes – phonological and lexical – become more efficient and automatic over time, promoting more fluent and accurate reading (Taboada Barber, 2022).

Research indicates that skills related to phonological processing play a crucial role in the acquisition and development of reading. This processing involves components such as phonological awareness, access to the lexicon and phonological working memory, which are essential for the understanding and production of both oral and written language (Silva, 2015; Rodrigues, 2017; Faiad, 2021; Çigdemir, 2022; Stein, 2024).

Phonological processing refers to the efficient use of sound information in language, and is essential for reading and writing. When a child has difficulties in this area, it is common for them to also face challenges in activating accurate visual processing, compromising the phonological access necessary to decode words and write correctly (Çigdemir and Akyol, 2022).

Therefore, phonological processing is considered an active element in written encoding and reading decoding. Children with difficulties in this area often demonstrate changes in reading fluency and difficulties in understanding texts. These challenges may be due to deficits in phonological perception and the limited capacity to store information in working memory, negatively affecting their school performance. In this sense, this study aimed to evaluate the development of word and pseudoword reading skills.words in elementary school students in Macapá, considering the variables of age, gender and school year, through the Test of Reading Competence of Words and Pseudowords (TCLPP).

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METHOD

PARTICIPANTS

The study included 290 elementary school students from a public school in Macapá. The sample was selected by convenience, with 45.9% of the participants being female and 54.1% male. The students' ages ranged from 5 to 9 years, with an average of 7.12 years and a standard deviation of 1.23. Regarding schooling, the sample included students from the 1st to 4th grade of elementary school I. To detail the distribution of the participants' ages and school years, the corresponding frequencies and percentages were calculated, presented in Table 1.

Table 1- Frequency by age and school year of children participating in the research

AGE	1		2		3		4		Total	
	F	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
5	25	25,3	0	0,0	0	0,0	0	0,0	25	8,6
6	63	21,7	16	22,9	0	0,0	0	0,0	79	27,2
7	11	11,1	51	72,9	5	22,7	3	3,0	70	24,1
8	0	0,0	3	4,3	14	63,4	50	50,5	67	23,1
9	0	0,0	0	0,0	3	13,6	46	46,5	49	16,9
Total	99	100,0	70	100,0	22	100,0	99	100,0	290	100,0

Source: Prepared by the Authors (2024)

Considering the data in Table 1, it can be seen that the five-year-old students are exclusively in the first grade, unlike the other age groups, who are distributed across at least two school years. The majority of the six-year-olds (79.7%) were enrolled in the first grade. In the second grade, the majority are 7-year-old students (72.9%) and in the third grade, the majority are eight years old (63.4%). As for the fourth graders,

INSTRUMENT

Word and Pseudoword Reading Competence Test – TCLPP (Seabra & Capovilla, 2010)

The test assesses silent reading competence, with eight practice attempts and 70 test attempts, each with a pair consisting of a picture and a written item. The child's task is to mark with an “X” the incorrect picture-written pairs. There are seven types of randomly ordered pairs, with ten items of each type of regular correct words. As explained in

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Capovilla and Capovilla (2004), performance by word class indicates the reader's difficulties. The maximum score is 70 correct answers. According to Capovilla, Gütschow and Capovilla (2003), the reliability of the TCLPP, in a test and retest evaluation after 12 months, obtained a Pearson correlation coefficient of 0.50 (p<= 0.001).

There are seven types of pairs, randomly distributed throughout the test, with ten test items for each type of pair. They are: 1) correct regular words, such as FADA under the figure of fairy; 2) correct irregular words, such as TÁXI under the figure of taxi; 3) words with semantic incorrectness, such as TREM under the figure of bus; 4) pseudowords with visual changes, such as CAEBÇA under the figure of head; 5) pseudowords with phonological changes, such as CANCURU under the figure of kangaroo; 6) homophone pseudowords, such as PÁÇARU under the figure of a bird; 7) strange pseudowords, such as RASSUNO under the figure of a hand. Picture-writing pairs composed of correct regular and irregular words should be accepted, while those composed of words with semantic incorrectness or pseudowords should be rejected.

The pattern of errors in each type of item is indicative of the reading strategies used by the child and those with which he or she has difficulty, as long as this pattern is configured with statistical significance. The error of rejecting pairs with correct irregular words may indicate difficulty with lexical processing or lack thereof. The error of failing to reject homophone pseudowords may also indicate difficulty in lexical processing, but at a more pronounced level, with exclusive use of the phonological route. The failure to reject pseudowords with phonological changes may indicate that the child is reading through the phonological route, that is, through strict graphophonemic decoding, without using the lexical route, but with the aggravating factor of difficulties with phonological processing. The failure to reject semantically incorrect words indicates that the child is not accessing the semantic lexicon. The failure to reject pseudowords with visual changes may indicate difficulties with phonological processing and recourse to the logographic reading strategy. Finally, the failure to reject strange pseudowords may suggest serious reading or attention problems. Due to the intrinsic relationships between the seven types of picture-writing pairs of the TCLPP, an internal check of the conclusions and a considerable cross-validation of the evidence provided in each type of picture-writing pair are possible..

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TCLPP Example

			
MACHINE	TINY	TÁCSI	MELOCE

PROCEDURE

Scientific ethical procedures were followed to conduct this research. The school was contacted to obtain administrative authorization to conduct the research through the Macapá Department of Education, which previously analyzed and approved the proposed research project at the time. In order to obtain authorization from the students' parents or guardians so that they could participate in the research, a parent meeting was held to present the objectives of the research, clarify the data collection procedure, and use of the results obtained. Only students who had signed the Free and Informed Consent Form (FICF) participated in the study. The instrument was administered in two independent sessions, following the application rules described in the instrument manual or provided by its authors. The Word and Pseudoword Reading Competence Test (TCLPP) was used to assess different aspects of the students' reading competence. The application was carried out collectively in the classroom and lasted 20 to 30 minutes. The data analysis for this study was conducted with the aim of understanding students' performance in different aspects of reading skills, based on the results of the TCLPP. To ensure a robust assessment, several statistical techniques were applied, as described below.

Initially, descriptive statistics were used to calculate the means, standard deviations and frequencies in each category of TCLPP items. This step allowed us to obtain an overview of students' performance, highlighting which categories presented greater difficulties and which were overcome more easily. Through this analysis, it was possible to identify general trends in the development of reading skills and verify the distribution of scores among participants.

In order to explore possible differences in performance between genders, Student's t-test was applied. This comparative analysis was essential to verify whether there were significant variations between boys and girls in the use of phonological and lexical routes, reflecting possible differentiated learning patterns between genders.

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Next, an Analysis of Variance (ANOVA) was performed to investigate the influence of the variables age and school year on students' overall performance. ANOVA allowed us to verify whether academic progress and increasing age were associated with improvements in reading skills, identifying significant differences between the age groups and school years evaluated. Finally, for a more detailed analysis of the differences found, the Tukey test was applied, which identified which age groups and school years presented significant variations in the means. This test was crucial to accurately point out the inflection points in the development of reading skills, allowing us to understand which age groups and school levels require greater attention to optimize learning.

RESULTS AND DISCUSSION

Descriptive statistical analyses were conducted of the total score and in each category of Word and Pseudoword Reading Skill (WRPS). Table 2 refers to the minimum and maximum number of correct answers, means and standard deviation of each category and of the WRPS total..

Table 2. Descriptive statistics of the number of correct responses by categories and total in the TCLPP

TCLPP	Minimum	Maximum	M	SD
Regular Correct Words	0	10	7.47	2.69
Irregular Correct Words	0	10	6.70	2.60
Words with Semantic Errors	0	10	7.11	3.20
Pseudowords with Visual Errors	0	10	6.17	3.16
Pseudowords with Phonological Errors	0	10	5.54	2.97
Homophone Pseudowords	0	10	4.21	2.87
Strange Pseudowords	0	10	7.22	3.30
Total Score	18	70	44.41	12.92

Source: Prepared by the Authors (2024)

According to the information contained in Table 2, the results revealed that the total score ranged from 18 to 70 points and with an average of 44.41 (SD=12.92), this score is equivalent to 63.44% of the total number of correct answers in the test. Also based on the data in Table 2, it can be observed that the sample presented a lower average (M=4.21; SD=2.87) in the Homophone Pseudowords category. Such results may reveal difficulties in the sample's lexical processing, or the errors suggest that reading is limited to phonological decoding (Capovilla & Capovilla, 2004). However, it is worth noting that this score is close to the midpoint (5 points) of the score in this category, which reflects some difficulties of the

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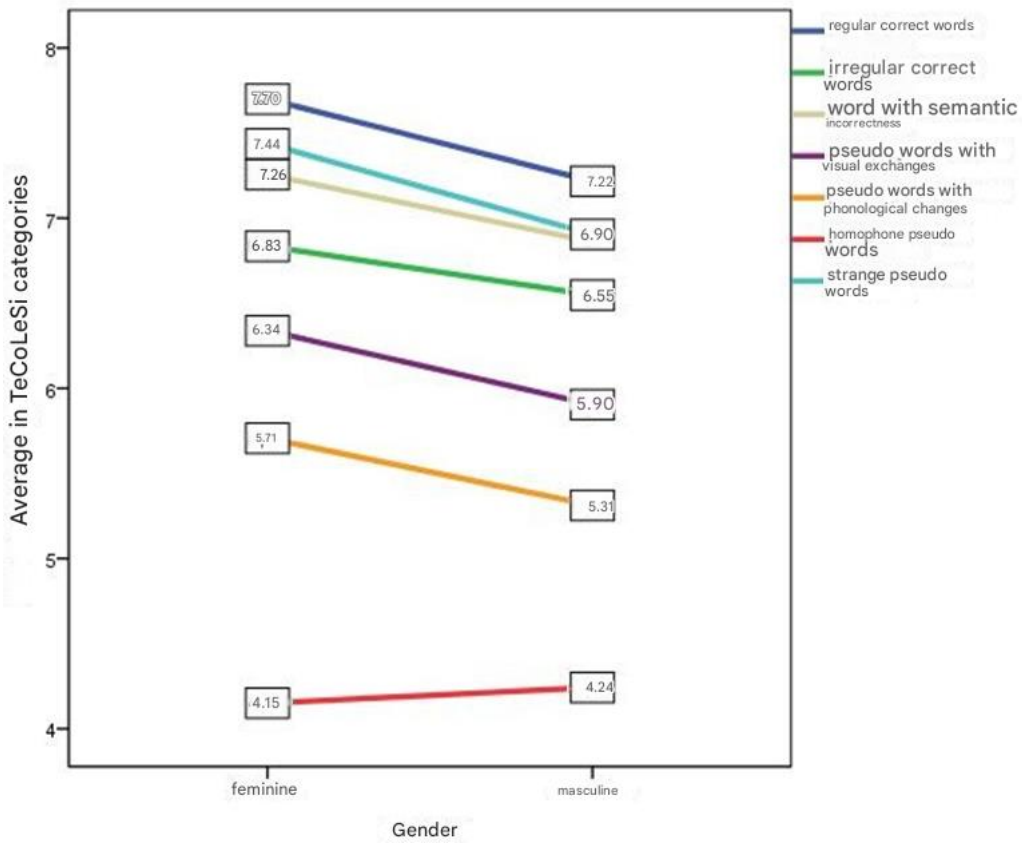
sample, which does not imply a compromise in phonological processing. Meanwhile, the sample presented higher averages in the Regular Correct Words category (M=7.47; SD=2.69). According to these results, the students made on average few errors in this category, which reveals their knowledge of the meaning of the words. This converges with the results found by Capovilla et al. (2004) when analyzing reading strategies and writing performance at the beginning of literacy in first-grade elementary school students.

A Student's t-test was performed to verify possible differences in the categories according to gender. The results indicated that there were no significant differences for any of the TCLPP categories, namely: Correct and regular words [t(288)=1.522; p=0.129]; Correct irregular words [t(288)=0.929; p=0.344]; Words with semantic incorrectness [t(288)=1.039; p=0.300]; Pseudowords with visual exchanges [t(288)=1.157; p=0.248]; Pseudowords with phonological changes [t(288)=1.120; p= 0.263]; Homophonic pseudowords [t(288)=1.359; p= 0.175]. In addition to the total TCLPP of [t(288)=0.597; p=0.111]. The averages can be better visualized in Figure4.

Figure 4. Averages in TCLPP categories according to gender



Analysis of variance was performed using ANOVA to verify whether there was a difference in age between participants in relation to their performance on the TCLPP. The

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results indicated significant differences for the following categories: words with semantic incorrectness [F(4, 285)=22.607; p<0.001]; Pseudowords with visual exchanges [F(4, 285)=18.177; p<0.001]; Pseudowords with phonological exchanges [F(4, 285)=7.216; p<0.001], Strange pseudowords [F(4, 285)=20.693; p<0.001]; Regular correct words [F(4, 285)=3.602; p=0.007]; Irregular correct words [F(4, 285)=3.672; p=0.012] and total TCLPP [F(4, 285)=22.068; p<0.001]. However, there were no significant differences for the category: Homophone pseudowords [F(4, 285)=0.329; p=0.859].

The Tukey test was performed to verify the differences between the age means as a function of the total in each TCLPP category. For the regular correct words category, only two groups were formed that explained the variance of the total score between ages. In these terms, a group was formed for the ages of 7 (M=6.73), 5 (M=7.04), 6 (M=7.18) and 8 years (M=8.04), and another for the ages 5 (M=7.04), 6 (M=7.18), 8 years (M=8.04) and 9 (M=8.24). According to these results, it can be seen that there were significant differences between the participants aged 7 and 9, since those aged 5, 6 and 8 were grouped in both groups. It can also be observed that there was a tendency for the average to increase as age increases, except for those aged 7, who had the lowest average in relation to the others, as can be better seen in Figure 5, as expected according to Seabra and Capovilla.(2010).

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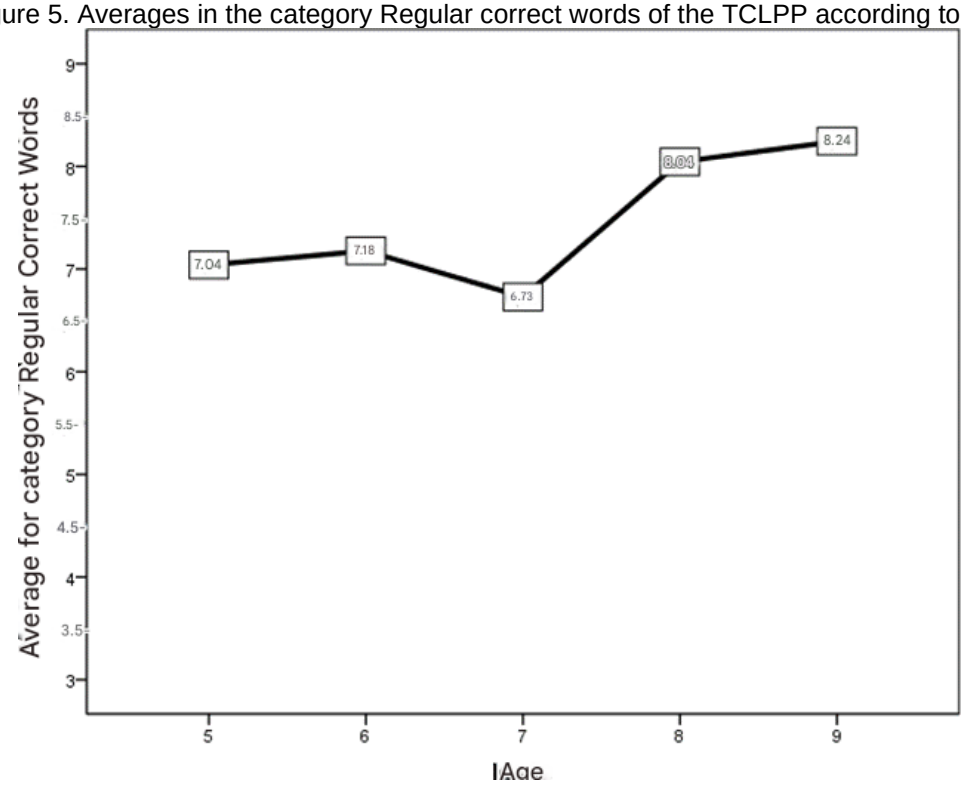
Figure 5. Averages in the category Regular correct words of the TCLPP according to age



When analyzing the results of the Tukey test for the category of correct irregular words, two groups were formed to explain the variance of the total score between ages. Therefore, one group was needed for ages 7 (M=5.80), 6 (M=6.62), 5 (M=6.96) and 8 years (M=7.13), and another for ages 6 (M=6.62), 5 (M=6.96), 8 years (M=7.13) and 9 (M=7.27). For this category, the results also reveal that there were significant differences between the participants aged 7 and 9, since those aged 5, 6 and 8 were grouped in both groups; in addition to a tendency for the average to increase as age increases, except for those aged 7, who had the lowest average in relation to the others, as can be seen in Figure 6. According to Seabra and Capovilla (2010), these results are expected in all categories of the TCLPP because phonological reading is replaced by logographic reading..

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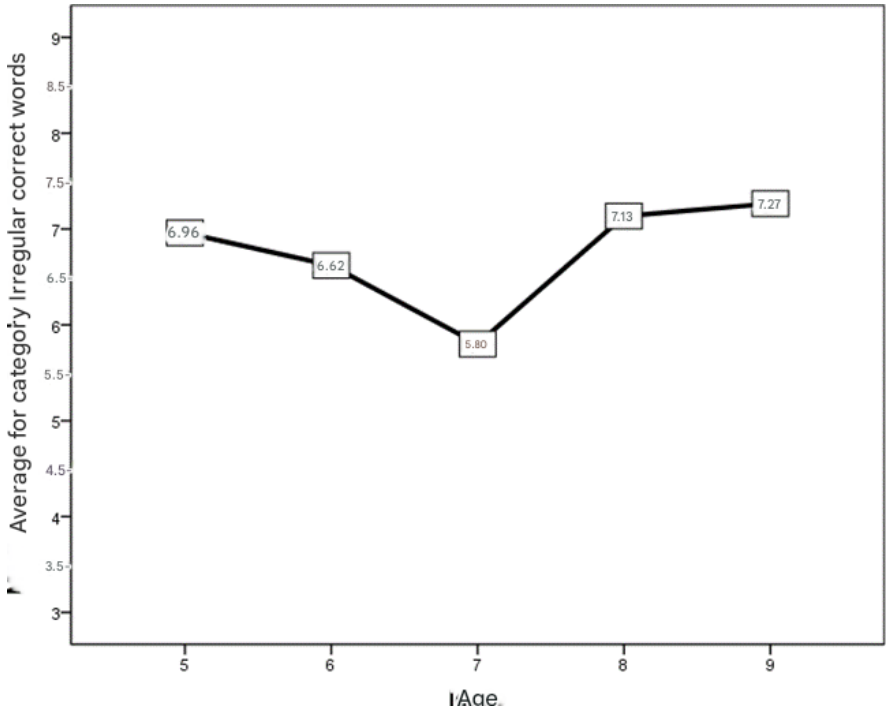

Figure 6. Averages in the category Correct irregular words of the TCLPP according to age regarding the category word with semantic incorrectness, the result of the Tukey test showed the formation of three groups to explain the variance of the total score between ages, one group for ages 5 (M=4.52) and 6 years (M=5.33), another for 7 (M=7.07) and 8 years (M=8.54), and a third for ages 8 (M=8.54), 9 years (M=9.00). For this category, the results also reveal that there were significant differences between participants aged 5, 6, 7 and 9, given that the 5 and 6 year-olds were in one group and the 7 and 8 year-olds in another and the 8 and 9 year-olds in another group, with the 8 year-olds being grouped into two groups. Again, as observed in the results mentioned above, there was a tendency for the average to increase as age increased, as can be seen in Figure 7.

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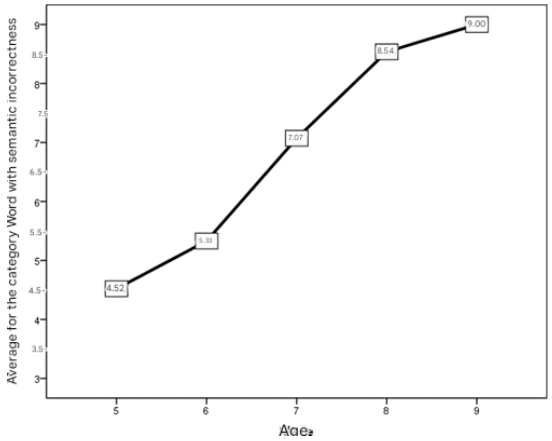

Figure 7. Averages in the category Words with semantic incorrectness of the TCLPP

according to age. For the category pseudowords with visual exchanges, the Tukey test identified the formation of three groups to explain the variance of the total score between ages. These groups were distributed as follows: the first for ages 6 (M=4.38) and 5 years (M=4.40), the second for ages 7 (M=6.10) and 8 years (M=7.37), and a third for ages 8 (M=7.37) and 9 years (M=8.02). For this category, the results also reveal that there were significant differences between participants aged 5, 6, and 7 and those aged 9.

It can also be observed that there was a tendency for the average to increase as age increased, except for those aged 6 and 5, who had the lowest average compared to the others, as shown in Figure 8.

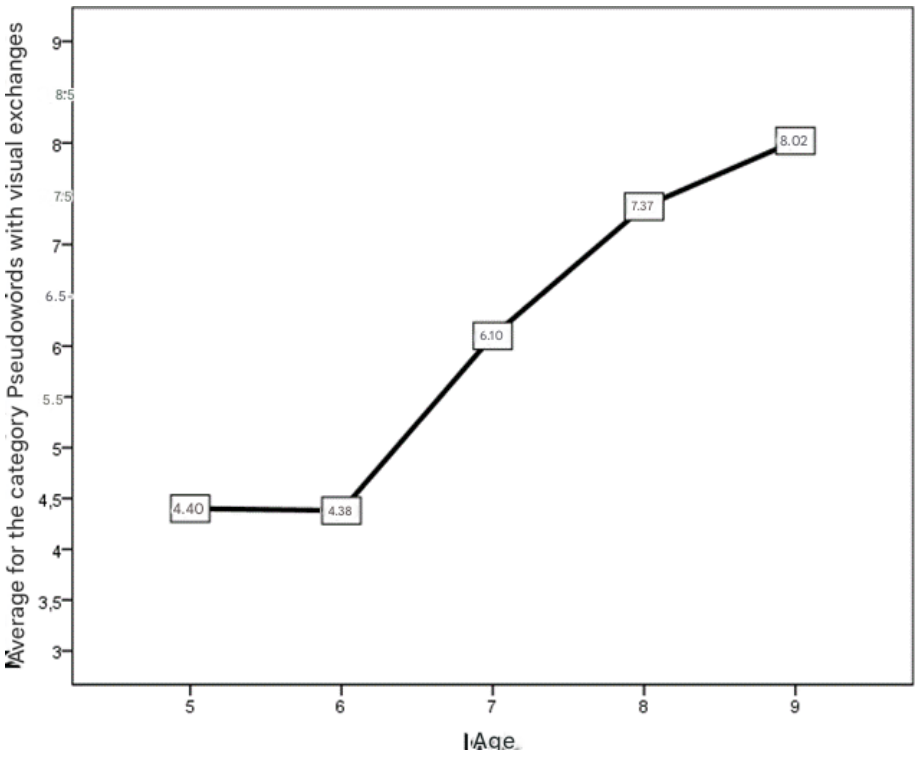

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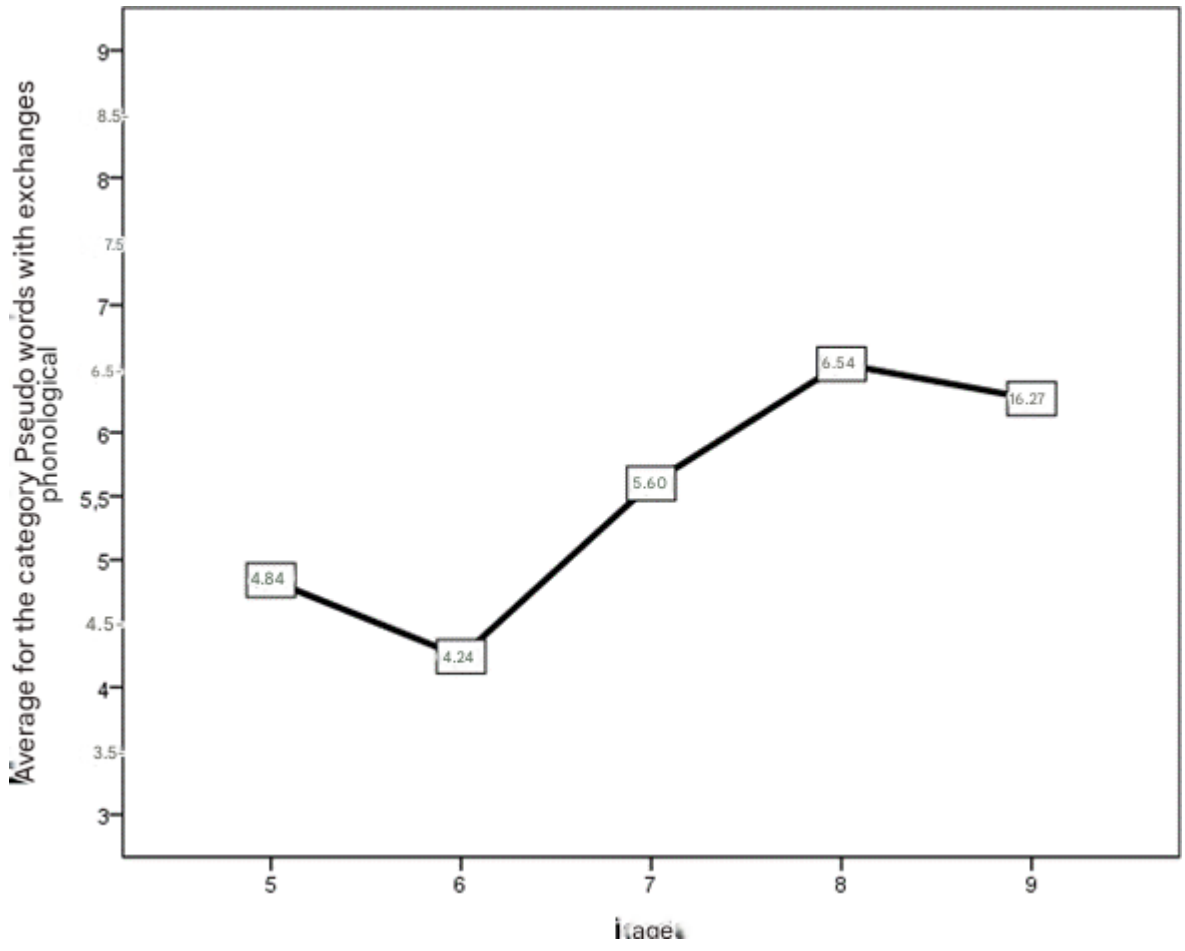
Figure 8. Averages in the category Pseudowords with visual exchanges of the TCLPP according to age in relation to the category Pseudowords with phonological exchanges. The Tukey test showed the formation of three groups to explain the variance of the total score between ages. Therefore, one group was needed for the ages of 6 (M=4.24), 5 (M=4.48) and 7 years (M=5.60), another for the ages of 5 (M=4.84), 7 (M=5.60) and 9 years (M=6.27) and finally a group for the ages of 7 (M=5.60), 9 (M=6.27) and 8 years (M=6.54). For this category, it is noted that the results indicated that there were significant differences regarding the participants aged 6 and 8 years. It is worth noting that the averages of those aged 5, 7 and 9 were clustered in the other groups. It can also be observed that there was a tendency for the average to increase for the 8-year-old students in relation to the others; except for those aged 6 and 5, who had the lowest average (Figure 9).

Figure 9. Averages in the category Pseudowords with phonological changes of the TCLPP according to age



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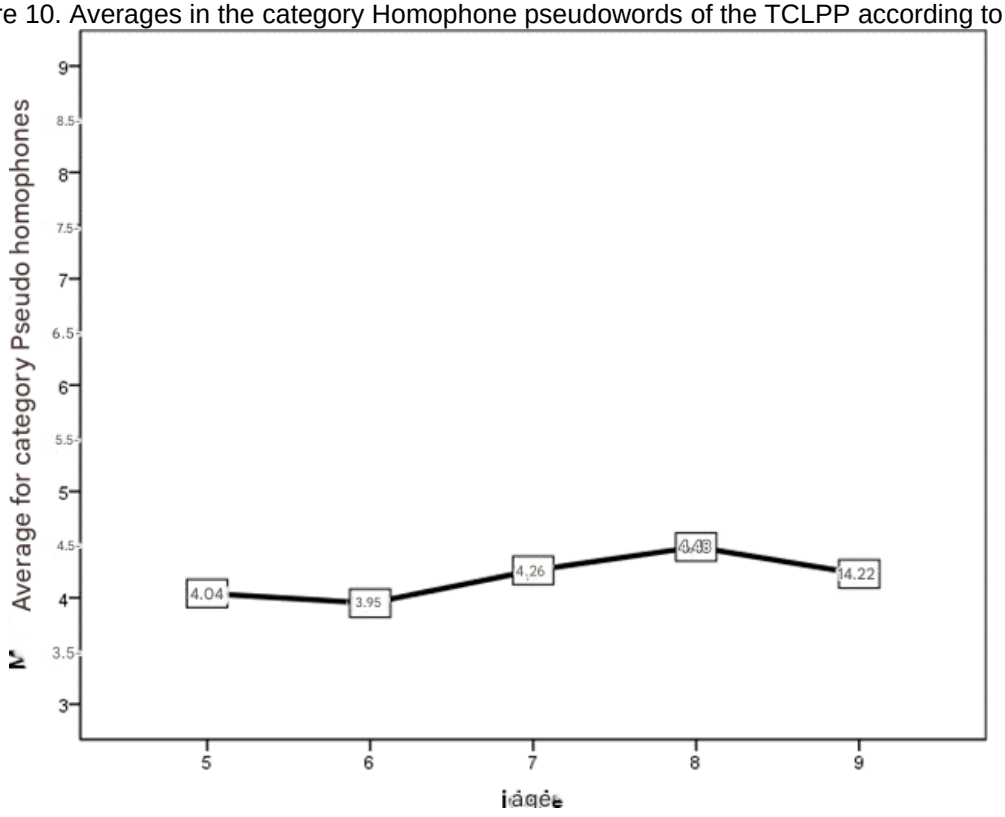
Regarding the homophone pseudowords category, the Tukey test showed the formation of only one group that explains the variance of the total score between ages, since there were no significant differences between them. Thus, participants aged 6 (M=3.95), 5 (M=4.04), 9 (M=4.22), 7 (M=4.26) and 8 (M=4.48) were grouped into a single group. These results corroborate the studies by Lukasova et al. (2008) who found the highest number of errors in homophone pseudowords when investigating the phonological decoding process to perform orthographic representations in the initial stages of reading. Based on Figure 10, there was a slight increase in the averages as age increased, except for the six-year-old students who presented the lowest average in relation to the others.

Figure 10. Averages in the category Homophone pseudowords of the TCLPP according to age



To explain the variance of the total score between ages for the strange pseudowords category, the Tukey test indicated the formation of three groups, which were distributed as follows: one group for ages 5 (M=4.68) and 6 years (M=5.37), another for ages 7 (M=7.33) and 8 years (M=8.64) and finally a group for ages 8 (M=8.64) and 9 years (M=8.98). In addition, the results also showed that there were significant differences for participants aged 5, 6 and 7 with those aged 9. And that the average for the 8-year-old students was grouped into two groups, with those aged 7 and those aged 9. It can also be

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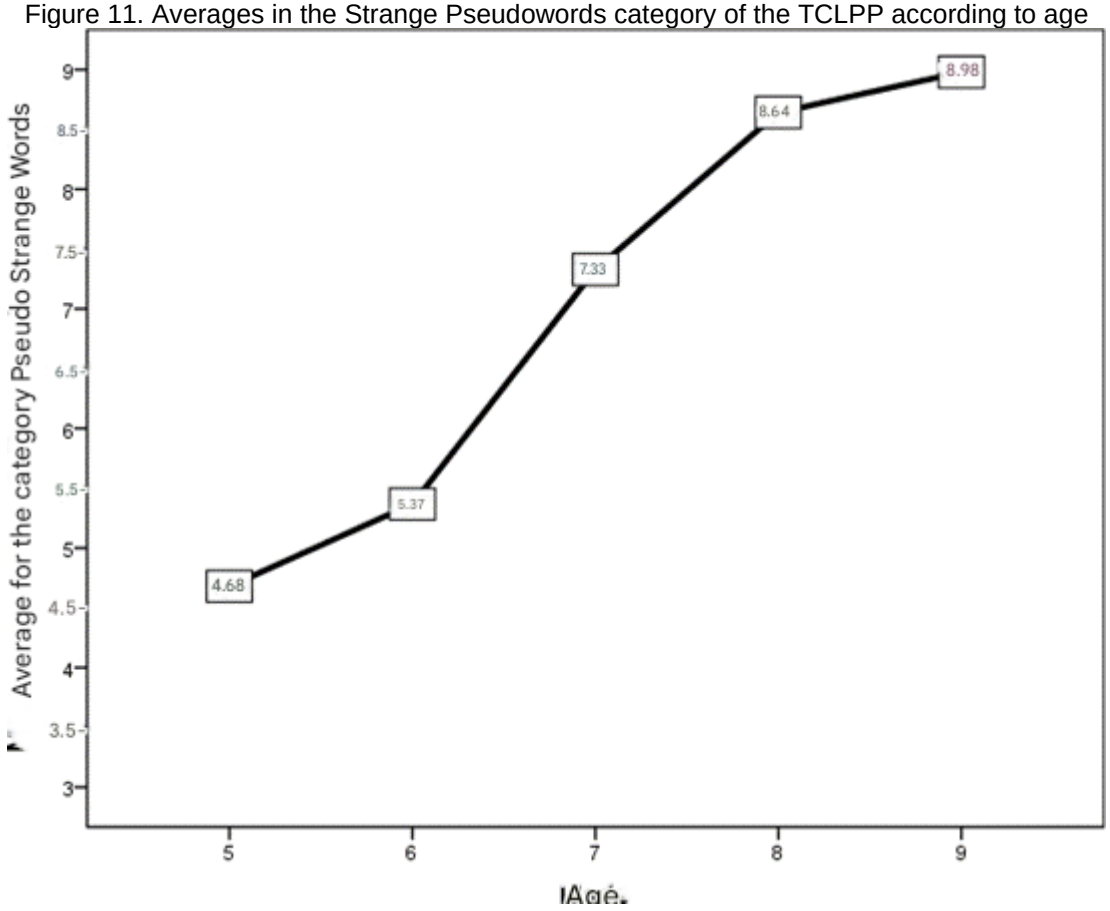
seen that there was a tendency for the average to increase as age increased, as can be seen in Figure 11.

Figure 11. Averages in the Strange Pseudowords category of the TCLPP according to age



Considering the results of the ANOVA for the total TCLPP between ages measured by the Tukey test, three groups were formed that explain the total variance. Thus, the first group was composed of the averages of students aged 5 (M=36.48) and 6 (M=37.06); another for those aged 6 (M=37.06) and 7 (M=42.89); and a last one for those aged 8 (M=50.75) and 9 (M=52.00). It is noted that those aged 6 were grouped together in two groups, together with those aged 5 and also together with those aged 7. It was also found that there was a tendency for the average to increase as age increases, as can be seen in Figure 12.

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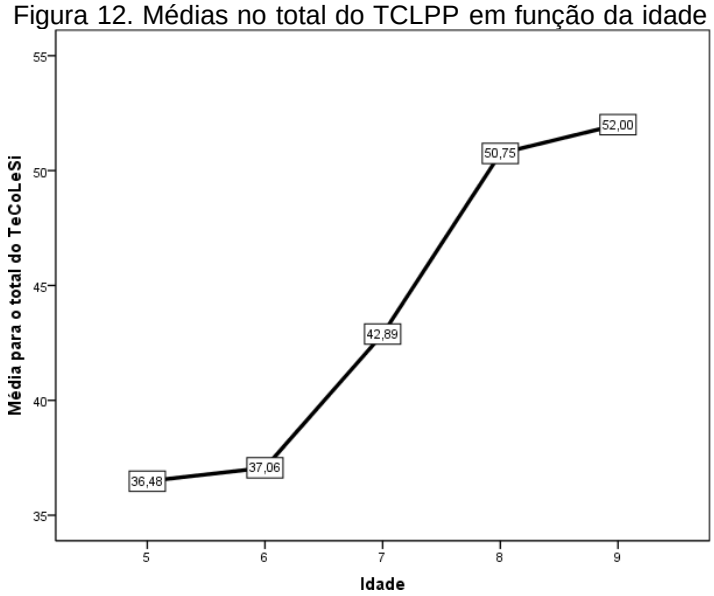
Figura 12. Médias no total do TCLPP em função da idade



It is also worth noting that these results allow us to verify the reading skills of the participants. In other words, regular correct words, visual and phonological exchanges are considered more complex, since they cannot be read correctly using the logographic strategy, since reading these words requires phonological and lexical processing from the reader. Words with semantic errors and strange pseudowords that obtained significant averages can be read correctly using the logographic, alphabetic and lexical strategies. On the other hand, homophone pseudowords, whose averages were lower, can only be read using the orthographic strategy. That said, it is worth noting that decoding errors of the items would occur if the reader were to use the alphabetic strategy. As a result, the reader would consider the homophone pseudowords as correct and reject the irregular correct words. According to the studies by Capovilla and Dias (2008b). Analysis of variance was performed using ANOVA to verify whether there was a difference by school year of the participants in relation to their performance on the TCLPP. The results indicated significant differences for the following categories: Words with semantic incorrectness [$F(3, 268)=44.050$; $p<0.001$]; Pseudowords with visual exchanges [$F(3, 268)=41.708$; $p<0.001$]; Pseudowords with phonological exchanges [$F(3, 268)=16.427$; $p<0.001$]; Strange pseudowords [$F(3, 268)=43.002$; $p<0.001$]; Regular words [$F(3, 286)=4.462$; $p=0.004$]; Correct irregular words [$F(3, 286)=5.720$); $p=0.001$] and the total TCLPP [$F(3, 268)=44.909$; $p<0.001$]. However, there were no significant differences only for the category: Homophone pseudowords [$F(3, 286)=1.333$; $p=0.264$].

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The Tukey test was performed to verify the differences between the means for each category about the school year attended. According to Table 3, for the category Regular correct words, there was a significant difference, however, the students from the first to fourth years were grouped into only one group, obtaining the following means, second, first, third, and fourth years. For this category, it was found that those who attended the second year had lower means than those who attended the first, third, and fourth years. In this sense, theoretically, students should make few errors, but if this happens, and depending on how often it occurs, it could indicate difficulty or lack of lexical processing (Capovilla & Capovilla, 2000, 2004; Salgado & Capellin, 2004).

Table 3. Tukey test for the category Regular correct words according to school year

			Subgroup for alpha=0.05	
School year			1	2
2		70	5.61	
N 1		99	6.84	6.84
3		22	6.91	6.91
4		99		7.22
	Sig.		0.057	0.876

Source: Prepared by the Authors (2024)

When analyzing the results of the Tukey test for the category Correct irregular words, two groups were formed that explain the variance of the score in this category according to the school year attended (Table 4). Thus, one group was formed for students who attended the second, first, and third school years, and another for the first, third, and fourth school years. For this category, the results also reveal that there were significant differences for the students who attended the second and fourth years. The students who attended the first and third years appeared in both groups. This theoretically denotes reading competence through the logographic route or the orthographic route (Capovilla & Capovilla, 2000, 2004; Capovilla, Capovilla & Suiter, 2004; Frith, 1990).

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Table 4. Tukey test for the category Correct irregular words according to the school year

			Subgroup for alpha=0.05	
School year			1	2
2		70	5.61	
N 1		99	6.84	6.84
3		22	6.91	6.91
4		99		7.22
	Sig.		0.057	0.876

SOURCE: AUTHORS

Regarding the category Words with semantic incorrectness, the results of the Tukey test showed the formation of three groups that explain the variance of the total score about the school year attended (Table 5). One group was for first-year students, another for third and second-year students, and a third group for fourth-year students. For this category, the results also reveal that there were significant differences between the participants from the first to fourth years. Given that those attending the third and second years were grouped in one group, the fourth-year students in another group, and the first-year students in another. It was also observed that the students in the first year had averages below the midpoint (5.5 points) of the TCLPP. This type of error could indicate a failure in the use of the lexical-semantic strategy or the phonological strategy with comprehension, or even a lack of access to the semantic lexicon. (Belfi-Lopes & cols., 2006; Capovilla & Capovilla, 2000, 2004).

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Table 5. Tukey test for the category Words with semantic incorrectness according to school year

			Subgroup for alpha=0.05		
School year			1	2	3
	1	99	4.68		
N	3	22		7.36	
	2	70		7.50	
	4	99			9.01
	Sig.		1,000	0.994	1,000

SOURCE: AUTHORS

No que tange a categoria Pseudopalavras com trocas visuais o teste *Tukey* identificou a formação de três grupos para explicar a variância do escore total em função do ano escolar frequentado (Tabela 6). Estes grupos assim ficaram distribuídos,o primeiro grupo para os alunos que cursavam o primeiro e terceiro ano escolar, o segundo grupo para os estudantes do terceiro e segundo ano escolar e um terceiro grupo para aqueles dos quarto ano. Para esta categoria os resultados também revelam que houve diferenças significativas quanto os participantes do primeiro e quarto na escolar. Verifica-se que os alunos do primeiro e terceiro anos escolares obtiveram médias abaixo do ponto médio (5,5 pontos) do TCLPP. Esses resultados, teoricamente, poderiam informar que erros nesta categoria sugerem dificuldade no processamento fonológico e poderiam indicar pouca atenção à forma da palavra (Capovilla & Capovilla, 2000, 2004).

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Table 6. Tukey test for the category Pseudowords with visual exchanges according to the school year

School year			Subgroup for alpha=0.05		
			1	2	3
	1	99	4.20		
N	3	22	4.82	4.82	
	2	70		6.03	
	4	99			8.34
	Sig.		0.656	0.108	1,000

SOURCE AUTHORS

Regarding the category of Pseudowords with phonological changes, the Tukey test once again showed the formation of two groups to explain the variance of the total score about the school year attended (Table 7): one group for students who attended the first, third, and second school year, and another for those who attended the second and fourth school year. For this category, the results also reveal that there were significant differences between the participants in the first, third, and fourth years. The students who attended the first and third years presented averages below the midpoint of the category (5.5 points). The errors presented in this category, theoretically, may indicate additional difficulties in the phonological processing itself, thus constituting a slightly more serious error than those in the category of Incorrect homophonous words (Capovilla & Capovilla, 2000, 2004; Lukasova et al., 2008).

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Tabela 7. Prova de Tukey para a categoria Pseudopalavras com trocas fonológicas em função do ano escolar

			Subgrupo para alfa=0,05	
Ano escolar			1	2
	1	99	4,24	
N	3	22	4,36	
	2	70	5,63	5,63
	4	99		6,90
	Sig.		0,062	0,103

Fonte: Elaborada pelos Autores (2024)

Ao ser analisada a categoria de pseudopalavras homófonas, o teste *Tukey* evidenciou a formação de um grupo para explicar a variância do escore total em relação ao ano escolar frequentado. Os alunos, em razão de não ter ocorrido diferenças significativas em função do ano escolar frequentado, foram aglomerados em um só grupo (Tabela 8).

Table 8. Tukey's test for the Homophone Pseudowords category as a function of school year

School Year	N	Subgroup for alpha = 0.05
3rd	22	3.50
2nd	70	4.01
1st	99	4.06
4th	99	4.63

Sig. = 0.207

Source: Prepared by the Authors (2024)

Therefore, given the results presented in Table 8, the participants presented the following averages: third year (M=3.50), second year (M=4.01), first year (M=4.06), and fourth year (M=4.63). For this reason, theoretically, if the reader accepts the set of words as correct, his/her answer could indicate difficulties or lack of lexical processing. This type of error also suggests that reading could be limited to phonological decoding, supported by auditory similarities with little attention to differences in the grapheme X phonemes relationship. In addition, it would indicate a lack of representation in the orthographic lexicon. These results corroborate the study by Capovilla et al. (2004).

To explain the variance of the total score according to the school year attended for the Strange Pseudowords category, the Tukey test showed the formation of three groups due to significant differences in their answers (Table 9). The results were distributed as follows: one group for students in the first year; another group for those in the third and

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second years, and finally a group for those in the second and fourth years. It can also be observed that there was a significant difference in the averages of students in the first year compared to the others. Therefore, theoretically, errors are not expected in this category, but if this were to occur, it could suggest reading problems with lexical, phonological, or even logographic absence.(Capovilla & Capovilla, 2000,2004).

Table 9. Tukey test for the category Strange pseudowords according to the school year

			Subgroup for alpha=0.05		
School year			1	2	3
1		99	4.71		
N 3		22		7.36	
2		70		7.79	7.79
4		99			9.09
	Sig.		1,000	0.872	0.089

SOURCE AUTHORS

Regarding the total TCLPP score as a function of the school year attended, the Tukey test showed the formation of three groups due to significant differences in their responses (Table 10). The results were distributed as follows: one group for students who were in the first year; another group for those who were in the third and second years; and finally a group for those who were in the fourth year. It can also be observed that there was a significant difference in the averages of students who were in the first year about the others. Therefore, theoretically, errors are not expected in this test in competent readers, but if this were to occur, it could suggest reading problems with lexical, phonological, or even logographic absence (Capovilla & Capovilla, 2000, 2004).

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Table 10. Tukey test for the total score of the TCLPP according to the school year

			Subgroup for alpha=0.05		
School year			1	2	3
	1	99	35.73		
N	3	22		42.09	
	2	70		43.49	
	4	99			53.36
	Sig.		1,000	0.916	1,000

SOURCE AUTHORS

The results also indicate that there was a tendency for the average to increase in all categories of the TCLPP, as the school years progressed, which denotes the importance of the school years in the development of these skills and the subsequent literacy process. These results are in line with the results found by Capovilla and Dias (2008a), Capovilla, Varanda, and Capovilla (2006), and Salles and Parente (2002, 2006).

Thus, it can be said that, in general, the performance of the present sample evaluated by the TCLPP presented a well-established logographic strategy, and a partially established alphabetic strategy, however, it is under development with an orthographic strategy still in its infancy.

CONCLUSION

The present study aimed to evaluate the reading competence of words and pseudowords in Elementary School I students from a public school in Macapá, using the Word and Pseudoword Reading Competence Test (TCLPP). Data analysis allowed us to identify important aspects of the development of reading skills among participants, considering variables such as age, gender, and school year.

The results showed that students' performance progressively improves with advancing age and schooling, confirming the significant influence of these factors on the development of reading skills. However, some specific categories, such as homophone pseudowords and those with phonological changes, presented greater difficulty, suggesting

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that there are challenges in the use of phonological and lexical strategies. The predominance of errors in certain categories indicates that, in some cases, students still rely on more rigid phonological decoding, without fully using the lexical route.

In addition, no significant differences were found between boys and girls in overall performance, indicating that gender was not a determining factor in the reading competence of the participants. Analysis of variance (ANOVA) and Tukey's test revealed that age and school year are critical variables in the improvement of reading skills, showing a consistent pattern of growth in averages as students progress through the school years.

This study has some limitations that should be considered when interpreting its results. First, the sample was composed of convenience, limited to a specific public school in Macapá, which may restrict the generalization of the findings to other educational contexts in the region or the country. In addition, the study focused only on elementary school students, not covering other stages of basic education that could provide a more complete view of the development of reading skills over time. Finally, external factors, such as emotional, social, and family aspects, which can also impact reading performance, were not investigated, which suggests the need for future research with a more comprehensive approach.

These results reinforce the importance of pedagogical practices that stimulate the development of both phonological and lexical pathways, especially in the early stages of literacy. The need for specific interventions becomes evident to improve performance in more complex categories and promote fluent and comprehensive reading.

Therefore, this study contributes to the understanding of the development trajectories of reading competence and offers support for targeted educational interventions. Further investigation of these findings, especially with larger and more diverse samples, can support the formulation of more effective pedagogical strategies, ensuring that all students, regardless of their characteristics and contexts, fully develop their reading and writing skills.

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