

# MONITORING ORAL READING FLUENCY IN ELEMENTARY SCHOOL I

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## Abstract

*Introduction:* Assessment measures of oral reading fluency can be applied by teachers or education professionals and help to provide an overview of the academic development in reading of each student; and when these simple measures are systematically applied over time, they can be used to track a student's possible difficulties. *Aim:* This study aimed to monitor the development of oral reading fluency in students from the 2nd to the 5th grade of Elementary School I during the school year. *Method:* This study was approved by the research ethics committee (09575419.0.0000.5406) of the home institution. The study included 400 students from the 2nd to the 5th grade of Elementary School I from a municipal public school in the interior of the State of São Paulo, aged from 7 years to 10 years and 11 months. The Performance Assessment in Reading Fluency was applied. Reading fluency measures were performed by collecting oral reading of three texts of the same textual complexity in the months of March, July and November. For the analysis of each text, the analysis parameters of the types of errors made during reading were used, referring to words read correctly and incorrectly per minute. *Results:* The results were statistically analyzed using the Statistical Package for Social Sciences, version 22.0, with a significance level of 5% (0.050). With the application of the Wilcoxon Signed Rank Test, it was possible to verify that there was a statistically significant difference in the groups of this study both for the total number of words read correctly in one minute and the total number of words read incorrectly between the third moment of the fluency measure in comparison with the first moment. With the application of the Mann-Whitney Test, it was possible to verify that there was a statistically significant difference, indicating that the groups had a lower number of words read correctly per minute in the first reading measure compared to the second and third measures. This same finding was found in the reading of misspelled words per minute. *Conclusion:* The results of this study allowed monitoring and accompanying in a simple, reliable and valid way, the progressive development of oral reading fluency, evidenced by the increase in the number of words read correctly and the decrease in the number of errors from the 2nd to the 5th grade of Elementary School I.

**Keywords:** *Oral reading fluency, measurement, screening, progress monitoring, assessment.*

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## 1. Introduction

Oral reading fluency is a multidimensional construct with a three-factor structure (automaticity, accuracy and prosody) (Kim, Quinn, & Petscher, 2021). When the student acquires or improves his skills with the automatic decoding of words, becoming a fluent reader, he simultaneously releases attention and memory resources to use higher-order reading functions (Rasinski et al., 2017). For this reason, both assessment and intervention with reading fluency have been continuously studied by researchers (Bigozzi, Tarchi, Vagnoli, Valente, & Pinto, 2017; Kostewicz, Kubina, Selfridge, & Gallagher, 2016; Makebo Bachore, & Ayele, 2022).

Through oral reading fluency assessment measures, according to the literature (Hasbrouck & Tindal, 2006; 2017), this assessment can be used in different ways; the first (complicated by the small number of studies with Brazilian students who bring regulations to the population of other regions of the country; in addition to the lack of appropriate material), it would be based on the performance levels of the students, that is, based on short evaluations, comparing them with each other, thus obtaining a screening measure, an assessment focused on predicting the development and growth of reading skills (Alves et al., 2021; Pereira et al., 2021), which could determine whether a student would need support in reading (extra help or alternative forms of instruction), which would contribute to the early identification of students at risk of reading difficulties (Arnesen et al., 2017).

The second way to carry out the work with the students would be to observe the development of reading fluency with themselves over time and compare it to the class group. This second way of using oral reading fluency has been called a performance monitoring measure (Furey & Loftus-Rattan, 2022). Monitoring measures can be collected three times in the school year; they are short, individually administered assessments (typically 1 to 3 minutes in duration) that provide information on students' ongoing performance in reading fluency.

Thus, studies that assess reading fluency at the beginning of the school year and its growth throughout this year are critical. As few studies on oral reading fluency have been adapted as a screening and monitoring method in Brazil, this research is highly urgent. Furthermore, the need for psychometric validation of the screening measures concerns other researchers who are experts in reading fluency. While examining student progress over time is crucial, progress monitoring needs to be integrated into national reading assessments or broader reading tests.

## **2. Aim**

This study aimed to monitor the development of oral reading fluency in students from the 2nd to the 5th grade of Elementary School I during the school year.

## **3. Methods**

### **3.1. Participants**

This study was approved by the home institution's research ethics committee (09575419.0.0000.5406). The study included 400 students from the 2nd to the 5th grade of Elementary School I from a municipal public school (in a medium- and a small-sized Brazilian city, Southeast Region of Brazil) in the interior of the State of São Paulo, aged from 7 years to 10 years and 11 months. The schools were selected through convenience sampling (simple convenience sample). The students participating in the studies did not have a history of repeating grades; they were monolinguals and native speakers of Brazilian Portuguese.

The inclusion criteria for the sample selection were as follows: informed consent form signed by the parents or guardians for the students; students with no history of neurological or psychiatric illnesses, uncorrected auditory and visual impairments, and cognitive performance within normal, according to the description at the school records and teachers' reports. The exclusion criteria for the sample selection were the presence of genetic or neurological syndromes in the students and students who did not present a satisfactory reading domain level for observing the variable proposed in the study.

### **3.2. Materials and procedures**

The Performance Assessment in Reading Fluency was applied (Martins & Capellini, 2018). This procedure assessed reading fluency based on the number of words read correctly per minute. The instrument presents 70 passages (narrative and expository), with the word count, presented progressively per line to facilitate the evaluation, with passages that contain 64 to 194 words.

Initially, the passages were designed for students from the 1st to the 4th grade. However, a readjustment was necessary since most Brazilian students are not readers in the 1st year. The collection was restructured to be used as an assessment from the 2nd to the 5th grade when the first cycle of education in Brazil ends.

A study of the complexity of the passages was conducted and based on the fluency of oral reading; they were sequenced from the easiest to the more difficult passages since there is a range of criticisms for research that only uses readability formulas for selecting equivalent level probes (Ardoin, Suldo, Witt, Aldrich, & McDonald, 2005; Begeny & Greene, 2014). After this classification, a statistical analysis was conducted to categorise the passages by quartile to group the most similar texts. The averages of the passages were analyzed by quartile distribution and categorized into: low (< first quartile - Q1), regular (between the first and third - Q1 and third quartile - Q3), and high (> than the third quartile Q3). The normal distribution was verified using the Shapiro-Wilk test with Lillifor correction. Comparison between performance categories was performed using ANOVA for repeated measures and post hoc comparisons using the Bonferroni test. The significance level adopted was 5%. Data were analyzed using SPSS software, version 19.0 for Windows. Thus, sets of three passages were selected for each time of the year (beginning, middle and end) for each grade.

Reading fluency measures were performed by collecting oral readings of three passages with the closest possible textual complexity in March, July and November. For the analysis of each passage, the analysis parameters of the errors made during reading were used, referring to words read correctly and incorrectly per minute.

In this approach, the types of errors that are marked as WIPM are mispronounced words, words substituted with others, words omitted, words read out of order, addition or omission of word endings,

and hesitation (words on which the student paused more than 3 seconds, after which they are told the word, and it is marked as incorrect. If necessary, the student is said to continue with the following word (Martins & Capellini, 2018). The following items indicate all situations that are marked as WCPM: words pronounced correctly, self-corrections, words decoded slowly but ultimately read correctly, repeated words, words mispronounced due to dialect or regional differences, and words inserted. To quantify errors, scoring rules are also proposed for certain situations: lines or multiple words omitted; when one or more lines are not read (four or more omitted words in sequence), they are not considered errors, although those words are excluded from the WCPM (such that this rule is applied whenever a student skips four or more words within a sentence). If the student skips one, two, or three consecutive words, each word should be counted as an error (WIPM) (Martins & Capellini, 2018).

The Mann-Whitney Test was applied to verify possible differences between the three times of the year – March (beginning), July (middle) and November (end) for the WCPM and WIPM variables in each grade. After applying the Mann-Whitney Test, as statistical differences were found, the Wilcoxon Signed Rank Test was applied to identify which time of year variables (beginning, middle and end) differ when comparing two to two. The results were statistically analyzed using the Statistical Package for Social Sciences, version 22.0, with a significance level of 5% (0.050).

#### 4. Results

With the application of the Mann-Whitney Test, it was possible to verify that there was a statistically significant difference, indicating that the groups had a lower number of words read correctly per minute (WCPM) in the first reading measure compared to the second and third measures (see Table 1). This finding was also found in words read incorrectly per minute (WIPM), indicating that the number of errors decreased throughout the school year (see Table 2).

Table 1. Comparison of WCPM measures in 3 moments of the school year.

|                       | WCPM                  | n   | Average | SD   | Min   | Max   | Percentile 25 | Percentile 50 | Percentile 75 | Sig. (p) |
|-----------------------|-----------------------|-----|---------|------|-------|-------|---------------|---------------|---------------|----------|
| 2 <sup>nd</sup> grade | beginning of the year | 100 | 16.89   | 4.13 | 7.00  | 30.00 | 14.00         | 17.00         | 20.00         | < 0.001* |
|                       | middle of the year    |     | 23.38   | 4.94 | 9.00  | 32.00 | 21.00         | 24.00         | 27.00         |          |
|                       | end of year           |     | 27.14   | 5.91 | 10.00 | 37.00 | 24.00         | 28.00         | 31.00         |          |
| 3 <sup>rd</sup> grade | beginning of the year | 100 | 44.01   | 7.45 | 34.00 | 68.00 | 39.00         | 42.00         | 48.00         | < 0.001* |
|                       | middle of the year    |     | 49.75   | 7.39 | 36.00 | 73.00 | 44.25         | 49.00         | 55.00         |          |
|                       | end of year           |     | 54.29   | 6.80 | 36.00 | 69.00 | 49.25         | 55.00         | 59.00         |          |
| 4 <sup>th</sup> grade | beginning of the year | 100 | 58.04   | 3.04 | 50.00 | 68.00 | 56.00         | 58.50         | 60.00         | < 0.001* |
|                       | middle of the year    |     | 62.57   | 3.89 | 53.00 | 70.00 | 60.00         | 62.50         | 65.00         |          |
|                       | end of year           |     | 66.04   | 3.97 | 53.00 | 72.00 | 62.25         | 67.50         | 69.00         |          |
| 5 <sup>th</sup> grade | beginning of the year | 100 | 62.34   | 4.74 | 54.00 | 71.00 | 58.25         | 62.00         | 67.00         | < 0.001* |
|                       | middle of the year    |     | 64.30   | 4.60 | 56.00 | 72.00 | 60.00         | 64.00         | 68.75         |          |
|                       | end of year           |     | 71.02   | 5.08 | 58.00 | 79.00 | 68.00         | 71.00         | 75.00         |          |

\* Statistically significant difference

Table 2. Text Comparison of WIPM measures in 3 moments of the school year.

|                       | WIPM                  | n   | Average | SD   | Min  | Max   | Percentile 25 | Percentile 50 | Percentile 75 | Sig. (p) |
|-----------------------|-----------------------|-----|---------|------|------|-------|---------------|---------------|---------------|----------|
| 2 <sup>nd</sup> grade | beginning of the year | 100 | 5.57    | 2.20 | 2.00 | 10.00 | 4.00          | 5.00          | 7.00          | < 0.001* |
|                       | middle of the year    |     | 3.45    | 2.07 | 0.00 | 9.00  | 2.00          | 3.00          | 4.75          |          |
|                       | end of year           |     | 2.64    | 2.04 | 0.00 | 10.00 | 1.00          | 2.00          | 4.00          |          |
| 3 <sup>rd</sup> grade | beginning of the year | 100 | 1.07    | 1.51 | 0.00 | 7.00  | 0.00          | 1.00          | 1.75          | 0.005*   |
|                       | middle of the year    |     | 0.84    | 1.26 | 0.00 | 8.00  | 0.00          | 0.50          | 1.00          |          |
|                       | end of year           |     | 0.62    | 0.91 | 0.00 | 5.00  | 0.00          | 0.00          | 1.00          |          |
| 4 <sup>th</sup> grade | beginning of the year | 100 | 0.71    | 1.31 | 0.00 | 5.00  | 0.00          | 0.00          | 1.00          | < 0.001* |
|                       | middle of the year    |     | 0.29    | 0.62 | 0.00 | 3.00  | 0.00          | 0.00          | 0.00          |          |
|                       | end of year           |     | 0.07    | 0.26 | 0.00 | 1.00  | 0.00          | 0.00          | 0.00          |          |
| 5 <sup>th</sup> grade | beginning of the year | 100 | 0.21    | 0.48 | 0.00 | 2.00  | 0.00          | 0.00          | 0.00          | < 0.001* |
|                       | middle of the year    |     | 0.08    | 0.27 | 0.00 | 1.00  | 0.00          | 0.00          | 0.00          |          |
|                       | end of year           |     | 0.00    | 0.00 | 0.00 | 0.00  | 0.00          | 0.00          | 0.00          |          |

\* Statistically significant difference

With the application of the Wilcoxon Signed Rank Test, it was possible to verify that there was a statistically significant difference in the groups of this study both for the total number of words read correctly in one minute and the total number of words read incorrectly between the third moment of the fluency measure in comparison with the first moment when compared to peers, as can be seen in Table 3.

*Table 3. Comparison between pairs of reading measures at three times of the school year.*

|               |                    | 2nd grade | 3rd grade | 4th grade | 5th grade |
|---------------|--------------------|-----------|-----------|-----------|-----------|
| WCPM and WIPM | Time of year       | Sig. (p)  | Sig. (p)  | Sig. (p)  | Sig. (p)  |
| WCPM          | middle X beginning | < 0.001*  | < 0.001*  | < 0.001*  | < 0.001*  |
|               | end X beginning    | < 0.001*  | < 0.001*  | < 0.001*  | < 0.001*  |
|               | end X middle       | < 0.001*  | < 0.001*  | < 0.001*  | < 0.001*  |
| WIPM          | middle X beginning | < 0.001*  | 0.033     | < 0.001*  | 0.009*    |
|               | end X beginning    | < 0.001*  | 0.001     | < 0.001*  | < 0.001*  |
|               | end X middle       | < 0.001*  | 0.009     | 0.001*    | 0.005*    |

\* Statistically significant difference

## 5. Discussion

Data collection in three periods of the year, with a median of three passages with elementary school students, is an unprecedented form of monitoring in Brazil since we have yet to find scientific articles that used the WCPM measurement in this monitoring format. Moreover, this is just the first step to start disseminating this type of assessment among teachers, and discussions about how to use these measures need to be the second step. This is because it is necessary that students are identified for their reading difficulties and also as at risk for future problems. When WCPM measures are collected systematically throughout the school year, they can be monitored to ensure that interventions are offered as identified (Deno, 1985; Nese, 2022; Stecker, Fuchs, & Fuchs, 2008).

Progress monitoring data has been much discussed in the literature in the context of producing estimates of growth that are sufficiently reliable for educators to make meaningful inferences about a student's response to the intervention. WCPM data can be graphed over time and compared to a trend line of student performance against an established goal. For this action to occur, studies like this must make data-based decisions. Many advantages can be observed for using oral reading fluency monitoring; the assessments are quick and easy to administer, being performed the same way every time (Fuchs, Fuchs, Hosp, & Jenkins, 2001).

### 5.1. Implications and limitations

Many limitations can be observed in this current research; therefore, the results must be interpreted cautiously. First, the study includes students from only one region of the country. Since Brazil is a country of continental dimensions, with significant cultural differences and even speech rates, research must expand to other areas and increase the sample size, schools, years and grades to assess the external validity of these findings.

However, this small study is also an impetus for discussions about methods, procedures and instrumentation to continue to be evaluated and developed, which may reach the context of supporting RTI models in Brazilian schools.

## 6. Conclusions

Monitoring carried out throughout the school year with students from 2nd to 5th grade revealed differences that are early evidence that measures of oral reading fluency can be used to monitor student progress over an entire year, and that brings several advantages discussed for educators, mainly making it possible to identify students at risk, monitor student learning outcomes, assess intervention effectiveness, and develop benchmarks for Brazilian students.

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