

# TUTORING IN READING AND WRITING BASED ON THE RTI – RESPONSE TO INTERVENTION MODEL IN CHILDREN WITH DEVELOPMENTAL DYSLEXIA

## *Tutoria em leitura e escrita baseado no modelo de rti – resposta à intervenção em crianças com dislexia do desenvolvimento*

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### ABSTRACT

**Purpose:** to analyze and compare the reading and writing performance of children with developmental dyslexia after tutoring based on response to intervention model. **Methods:** fifteen children with the interdisciplinary diagnosis of developmental dyslexia participated in this study. They were attending 2nd to 6th year of elementary public school in Marília-SP, ranging in age from 8 to 12 years, 75% males. The children were assigned into Group I – experimental group (7 children who received intervention) and Group II – control group matched for gender and age (8 children did not receive the intervention). The children were subjected to a diagnostic survey of reading and writing performance and tutoring intervention program based on the model of Response to Intervention Model. The results were statistically analyzed by Wilcoxon and Kruskal-Wallis tests to check for possible differences in performance between the groups studied. **Results:** the results showed a statistically significant difference between the Group I and Group II, where children with dyslexia of Group I showed higher performance than children of Group II in word reading and reading the book I tasks. **Conclusion:** group I presented significant advances compared to Group II, which had no tutoring intervention.

**KEYWORDS:** Dyslexia; Reading; Writing; Preceptorship; Remediation.

### ■ INTRODUCTION

The number of children with difficulties in reading and writing has been growing in the school context. Consequently, this fact has aroused the interest of the scientific community to try to understand the difficulties that generally interfere with reading, writing and mathematical calculation<sup>1</sup>. Changes in academic learning that cause damage and learning problems are related to methodological issues and

formal academic education while the problems related to the development and learning are related to a failure in the processing of the reading and writing information by disorders originated in the central nervous system<sup>2</sup>.

From this perspective, it is important to identify individuals who exhibit such changes, as well as information processing failures, such as children with developmental dyslexia. These children need to be stimulated in the impaired areas, such as reading and writing, so that they can effectively participate in the proposed activities in the classroom. Neuropsychological dysfunctions that affect the linguistic and cognitive functions and, consequently, the development of reading and writing, underlie developmental dyslexia features<sup>3,4</sup>.

Focusing on helping children with learning disorders such as developmental dyslexia<sup>5</sup>, the RTI (Response to Intervention Model) can assist in the instruction of reading and writing inside or outside the classroom. The response of children to

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this instruction is assessed by universal screening instruments, which are administered periodically throughout the school year. Children are identified as risk factors for the diagnosis of developmental dyslexia on the basis of this selection. Subsequently, it should be applied an additional short term intervention. Progress of the monitoring is used to measure the response of children to intervention. This intervention can evolve from small groups to individual lessons based on the needs of the child, i.e., those who do not respond to supplemental intervention are considered at risk for dyslexia and may benefit from a more specialized education provided within a special educational context<sup>5</sup>.

From this perspective, there is a large body of research on instructional modality and procedures<sup>6, 7</sup> offered outside the regular classroom to help children with difficulties in early reading and writing skills. Tutoring is a modality in which the tutor provides individual support to students looking to improve results. Interventions based on tutoring contribute to the development of the skills of reading and writing of the child, as well as being a facilitative via for performance in the context of the classroom. In other words, intensive intervention in the form of tutoring is done individually in education, in which the tutor helps the student to overcome their difficulties, becoming an important mediating element for an effective pedagogical interaction and academic performance<sup>8</sup>.

Thus, children with a diagnosis of developmental dyslexia may benefit from the opportunity to participate in interventions that aim to provide activities centered on instructional tutoring. The aim of this research was to analyze and compare the performance in reading and writing in children with developmental dyslexia after tutoring based on response to intervention (RTI) model.

## METHODS

This study is characterized as a quasi-experimental study with children from 2<sup>nd</sup> to 6<sup>th</sup> school year from municipal schools in the city of Marília – SP, who were treated in the Center for the Study of Education and Health – CEES/UNESP. There were 15 participants in this study with the diagnosis of interdisciplinary developmental dyslexia, aged from 8 to 12 years old, 75% male and 25% female, divided into:

- Group I (GI): consisting of seven children, who received tutoring,
- Group II (GII): consisting of eight children, who did not received tutoring.

Inclusion criteria were: children with visual and hearing acuity and cognitive performance within the

normal ranges – described in the records from the CEES; children at risk of developmental dyslexia demonstrated by evaluation from CEES; children at risk of learning disabilities demonstrated by evaluation from CEES, having never participated in phototherapy, educational or neuropsychological intervention programs.

Children who had visual and auditory acuity and cognitive performance below normal ranges were excluded – description in medical records from the CEES; genetic syndromes or other syndromes; hearing impairment; visual impairment and/or mental disabilities.

To carry out this study, the following procedures were used:

a) Informed Consent Form: According to resolution of the National Health Council CNS 196/96, prior to the start of ratings, parents or guardians from the selected patients signed an Informed Consent Form for the release of the study.

b) Survey Diagnostic for reading and writing: This instrument was administered individually in children both in the experimental group – GI and the children in the control-group GII, being a one-hour-long application. The instrument evaluated the performance of children through six tasks: In the task of writing concepts (1), it is asked them to identify sixteen concepts (the front of the book, where to read, where to start reading, which direction to follow, the meaning of punctuation, among others). In the task of writing free words (2), the child is asked to write as many words as they know in a sheet of paper for five minutes and then read them. In the task of writing dictated words (3), the child was asked to write four words (one syllable – *rã* (frog), a two syllable – *carro* (car), a three syllable – *brinquedo* (toy) and a polysyllable – *chocolate* (chocolate), chosen from a list of previous words) and two simple phrases – “*Pitoco come bolo*” (Pitoco eat cake) and “*Ele bebe leite*” (he drinks milk). In the task of identifying letters (4) the child was asked to recognize uppercase and lowercase letters of the alphabet and point a word with each letter. In the task of reading words (5), the child was asked to read a list consisting of 14 simple and complex words with product names, logos taken from known objects for the population of children studied. In book reading task (6), the first book was illustrated (“*A Foca Famosa*” – The Famous Seal, by Sonia Junqueira – Estrelinha series) containing 111 words composed of simple and easy syllable to understand and the second (extracted from *Cartilha Pipoca*, by Paul N. Almeida) containing 106 words composed of simple and complex syllable, lack of pictures and more complex sentences, besides the implicit outcome.

c) Tutoring program: it was performed at the Investigation Learning Disabilities Laboratory of Center for the Study of Education and Health – CEES/UNESP in Marília, in eighteen individual sessions lasting one hour each with a weekly frequency. Thus, the program followed the following steps:

- rereading done by the student or read together with the researcher\tutor from a book already read in the previous session.
- retelling the story previously read and identification of letters done by the student through ludic activities with a focus on letter-sound relationship (mobile alphabet letters, written on bond paper, magnetic whiteboard);
- oral and written division of words into syllables for the child to pay attention to the sounds;
- sentences written by the student from the retelling and building of the same story of the book (building);
- division of sentences into words, words into syllables (building);
- introduction of a new book and reading this book with the aid of the researcher\tutor.

It is noteworthy that both the diagnosis survey and the tutoring program used in this research were based on the *Reading Recovery* Program proposed by Mary Clay<sup>9</sup>.

This study was approved by the Research Ethics Committee (REC) from the Sciences and Philosophy College from the São Paulo State University “Júlio de Mesquita Filho” – UNESP – Marília – São Paulo – Brazil, under protocol number 1589/2008.

The results were statistically analyzed using the Wilcoxon test and Kruskal-Wallis test for possible differences in task performance between groups and analysis of variance, being adopted a significance level of 5% ( $p = 0.05$ ). For data analysis, it was used SPSS program (Statistical Package for Social Sciences) version 13.0.

## ■ RESULTS

In Table 1 it can be seen that the average, standard deviation and the calculated value results revealed significant differences for the variables of reading words and reading book 1 in children with dyslexia who participated in the interventions ( $Z = 1,96, p < 0,05$ ).

**Table 1 – Average, standard deviation, median and “p” value referring to GI children’s performance as to the scores in reading and writing tasks**

| Pair of Variables | n | Average | Standard deviation | Minimum | Maximum | Median | Significance (p) |
|-------------------|---|---------|--------------------|---------|---------|--------|------------------|
| CW_PRE            | 7 | 76,20   | 18,52              | 37,00   | 100,00  | 75,00  | 0,929            |
| CW_POST           | 7 | 75,13   | 13,84              | 56,00   | 100,00  | 70,00  |                  |
| FW_PRE            | 7 | 64,73   | 23,53              | 16,00   | 94,00   | 63,00  | 0,201            |
| FW_POST           | 7 | 72,67   | 20,91              | 40,00   | 100,00  | 76,00  |                  |
| WD_PRE            | 7 | 75,13   | 22,53              | 19,00   | 100,00  | 74,00  | 0,056            |
| WD_POST           | 7 | 82,67   | 18,39              | 34,00   | 100,00  | 90,00  |                  |
| IL_PRE            | 7 | 86,00   | 15,44              | 42,00   | 100,00  | 90,00  | 0,344            |
| IL_POST           | 7 | 88,67   | 10,15              | 70,00   | 100,00  | 90,00  |                  |
| WR_PRE            | 7 | 71,47   | 26,17              | 21,00   | 100,00  | 78,00  | 0,012*           |
| WR_POST           | 7 | 79,20   | 26,23              | 21,00   | 100,00  | 92,00  |                  |
| RB1_PRE           | 7 | 75,53   | 28,59              | 0,00    | 100,00  | 87,00  | 0,020*           |
| RB1_POST          | 7 | 84,20   | 17,43              | 43,00   | 100,00  | 90,00  |                  |
| RB2_PRE           | 7 | 70,33   | 33,52              | 0,00    | 100,00  | 85,00  | 0,451            |
| RB2_POST          | 7 | 76,53   | 22,11              | 40,00   | 100,00  | 86,00  |                  |

Legend: CW – Concept of writing; FW – Free writing; WD – writing under dictation; IL – Identification of letter; WR – Word reading; RB 1 – Reading Book 1; RB2 – Reading Book 2.

\* Wilcoxon test comparing pre and post testing of GI. It was adopted significance level of 5% ( $p = *0,050$ )

Table 2 shows the average, standard deviation and the value of “p” for Group 2 (GII) as to the score of the tasks of reading and writing. The findings showed no statistically significant differences in any

task of reading and writing proposed by the tutoring program, i.e., the children from GII who received no intervention did not advance on the tasks.

**Table 2 – Average, standard deviation, median and “p” value referring to GII children’s performance as to the scores in reading and writing tasks**

| Pair of Variables | n | Average | Standard deviation | Minimum | Maximum | Median | Significance (p) |
|-------------------|---|---------|--------------------|---------|---------|--------|------------------|
| CW_PRE            | 8 | 83,00   | 6,93               | 75,00   | 87,00   | 87,00  | 1,000            |
| CW_POST           | 8 | 83,00   | 4,36               | 80,00   | 88,00   | 81,00  |                  |
| FW_PRE            | 8 | 59,67   | 26,69              | 35,00   | 88,00   | 56,00  | 1,000            |
| FW_POST           | 8 | 58,33   | 16,07              | 40,00   | 70,00   | 65,00  |                  |
| WD_PRE            | 8 | 67,00   | 21,38              | 50,00   | 91,00   | 60,00  | 0,285            |
| WD_POST           | 8 | 88,33   | 2,89               | 85,00   | 90,00   | 90,00  |                  |
| IL_PRE            | 8 | 90,00   | 2,00               | 88,00   | 92,00   | 90,00  | 0,317            |
| IL_POST           | 8 | 92,67   | 6,43               | 88,00   | 100,00  | 90,00  |                  |
| WR_PRE            | 8 | 77,00   | 5,57               | 71,00   | 82,00   | 78,00  | 0,109            |
| WR_POST           | 8 | 84,00   | 8,54               | 75,00   | 92,00   | 85,00  |                  |
| RB1_PRE           | 8 | 89,00   | 3,46               | 87,00   | 93,00   | 87,00  | 1,000            |
| RB1_POST          | 8 | 88,33   | 0,58               | 88,00   | 89,00   | 88,00  |                  |
| RB2_PRE           | 8 | 79,67   | 6,11               | 73,00   | 85,00   | 81,00  | 0,285            |
| RB2_POST          | 8 | 83,00   | 5,20               | 80,00   | 89,00   | 80,00  |                  |

Legend: CW – Concept of writing; FW – Free writing; WD – writing under dictation; IL – Identification of letter; WR – Word reading; RB 1 – Reading Book 1; RB2 – Reading Book 2.

\* Wilcoxon test comparing pre and post testing of GI. It was adopted significance level of 5% ( $p = *0,050$ )

Table 3 gives the comparison of the groups in pre and post test scores as to the tasks of reading and writing worked in the intervention program of tutoring. The results revealed statistically significant differences for the variables concept of writing, writing under dictation, word reading, reading book 1 and book 2 ( $\chi^2(1) = 5,9915, p < 0,05$ ).

## ■ DISCUSSION

In this study, we compared the situations of pre and post testing in children with developmental dyslexia, in which the GI group received intervention tasks of reading and writing tutoring based on the RTI model and GII did not receive the intervention program. The GI group had a higher performance when comparing the analyzed tasks. Thus, the losses exhibited by the children with dyslexia lead to the understanding that these children have learning difficulties and need educational activities directed to assist in school performance.

In regards to the tasks of concept of writing and identifying letter, it was found that children from GII showed no significant differences when compared

**Table 3 – “p” value in a situation of pre and post testing on every task of reading and writing proposed by the tutoring program**

| Variable | Significance (p) |
|----------|------------------|
| CW_PRE   | 0,040*           |
| CW_POST  | 0,027*           |
| FW_PRE   | 0,086            |
| FW_POST  | 0,146            |
| WD_PRE   | 0,034*           |
| WD_POST  | 0,044*           |
| IL_PRE   | 0,292            |
| IL_POST  | 0,326            |
| WR_PRE   | 0,009*           |
| WR_POST  | 0,038*           |
| RB1_PRE  | 0,015*           |
| RB1_POST | 0,028*           |
| RB2_PRE  | 0,024*           |
| RB2_POST | 0,028*           |

\* Kruskal-Wallis test comparing the two groups concomitantly. Significance level of 5% ( $p = 0.050$  \*) was adopted. Legend: CW – Concept of writing; FW – Free writing; WD – writing under dictation; IL – Identification of letter; WR – Word reading; RB 1 – Reading Book 1; RB2 – Reading Book 2.

to GI. However, the elements of these variables, such as letter recognition, directional movement of writing, knowledge of letter sounds must be worked anyway, because children with dyslexia have impairments in the literacy process, where these elements are essential for good academic performance in the class context<sup>10</sup>.

In free writing tasks and writing under dictation it was also noticed no differences between the groups involved in the study during the post-testing. However, such results can be explained due to the words used for these tasks belonging to the category of regular words, i.e. words that have in their structure letters with uniform sounds, a sound for each letter, showing no ambiguity.

In the same perspective, observing writing tasks in a qualitative view of the results found, mostly dyslexic children had a satisfactory performance in the face of other tasks, such as free writing. When the criteria for program analysis on these tasks were observed, the children had no difficulties because the words were regular. Thus, the element of regularity of words should be taken into account by professionals when a program of reading and writing for this population of students is structured.

The results found in this study are consistent with studies that indicate interlinguistic factors<sup>10,11</sup> as responsible for the differences found in surveys conducted in some languages – differences in the regularity or transparency of its spelling, as it is known<sup>11</sup> that there are differences in the ease in which children acquire the skills of aptitude among languages. Thus, dyslexic children who speak Portuguese (a transparent language) are successful in using some alphabetic skills with regular words, as found in this study, for example.

Studies in this aspect<sup>15</sup> warn that although the main sign of dyslexia is often a reading problem; the deficit in writing is more properly regarded as one of several possible behavioral manifestations of an underlying cognitive deficit. Therefore, the professional involved in the schooling of the child process should also pay attention to spelling acquisition, as this capability needs to be crafted so that future losses are mitigated<sup>10,12,13</sup>.

The findings of this study indicate that the tasks of word reading and reading of books are related

to phonological awareness, attention and ability to short-term memory. However, one cannot affirm in this study the direct relationship of these functions, but it is possible to consider that these functions mentioned above can influence academic performance. Therefore it is necessary to emphasize that specific interventions aimed at the area of damage in children with dyslexia corroborate to help effectively to teach reading and writing<sup>14,15</sup>.

## ■ CONCLUSION

From the results of this study it can be concluded that there was a significant improvement in some tasks of reading and writing when these were administered in an intervention program based on a tutoring model on the RTI – Response to Intervention. With the proposal to move the process of reading and writing skills of children with dyslexia, this model also features an effectiveness in relation to the reduction of false-positive cases in regards to the disorder, thus offering a healthy way to help children with dyslexia in the schooling process.

From the previously mentioned aspects, it can be considered that the results of this study have practical implications for prevention, particularly emphasizing the importance of reading and writing tasks. For example, reading words and reading books (presented in increasing levels of complexity) are quite relevant to assist in the preparation of interventions aimed at reducing the failure of children experiencing developmental dyslexia activities. The literature suggests that the school experience of children with developmental dyslexia, when enriched with proper activities to the development of strategies, may allow a substantial improvement in the development of these skills.

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## RESUMO

**Objetivo:** analisar e comparar o desempenho em tarefas de leitura e escrita em crianças com dislexia do desenvolvimento após tutoria baseado no modelo de resposta à intervenção. **Métodos:** participaram deste estudo 15 crianças com o diagnóstico interdisciplinar de dislexia do desenvolvimento de 2º ao 6º ano do ensino fundamental da rede pública municipal da cidade de Marília-SP, com faixa etária de oito a 12 anos de idade, de ambos os sexos, sendo 75% do sexo masculino, divididos em Grupo I – grupo experimental (sete crianças que receberam intervenção) e Grupo II – grupo controle (oito crianças não receberam a intervenção, os mesmos foram pareados segundo sexo e faixa etária com o Grupo I). As crianças foram submetidas ao levantamento diagnóstico de Leitura e Escrita e ao programa de intervenção em tutoria baseado no Modelo de Resposta à Intervenção. Os resultados foram analisados estatisticamente por meio do teste de Wilcoxon e Teste de Kruskal-Wallis para verificar possíveis diferenças de desempenho nas tarefas entre os grupos estudados. **Resultados:** os resultados revelaram diferença estatisticamente significativa entre o Grupo I e o Grupo II, onde as crianças com dislexia do Grupo I apresentaram desempenho superior na tarefa de leitura de palavras e leitura do livro I em relação às crianças do Grupo II. **Conclusão:** grupo I apresentou avanços significativos comparados à Grupo II, que não recebeu intervenção de tutoria.

**DESCRITORES:** Dislexia; Leitura; Escrita; Tutoria; Remediação.

## ■ REFERENCES

- Machado AC, Capellini SA. Caracterização do desempenho de crianças com dislexia do desenvolvimento em tarefas de escrita. *Rev. Bras. Cresc. Desenv. Hum.* 2011;21(1):132-8.
- Fletcher M, Lyons GR, Luchs LS, Barnes MA. Transtornos de aprendizagem: da identificação à intervenção. Porto Alegre: Artmed; 2009.
- Capellini AS, Sampaio MN, Kawata KHS, Pnamr SLCA, Lorencetti MD, Smythe I. Eficácia terapêutica do programa de remediação fonológica em escolares com dislexia do desenvolvimento. *Rev CEFAC.* 2010;12(1):27-39.
- Germano GD, Capellini SA. Desempenho de escolares com dislexia, transtornos e dificuldades de aprendizagem em provas de habilidades metafonológicas (PROHFON). *J Soc Bras Fonoaudiol.* 2011;23(2):135-41.
- Catts HW. Identificação precoce da Dislexia. In: Alves L, Capellini SA. *Dislexia: novos temas, novas perspectivas.* São Paulo: WakEditora. 2011. p.55-70.
- Wanzek J, Vaughn S. Response to varying amounts of time in reading intervention for students with low response to intervention. *J. Learn Disabil.* 2008;4(2):126-42.
- Vellutino FR, Scanlon DM. The interactive Strategies approach to reading intervention. *Contemp. Edu. Psych.* 2002;27:573-635.
- Machado AC. Tutorial baseada na leitura de livros em escolares com dislexia do Desenvolvimento e distúrbio de aprendizagem. São Carlos [dissertação] São Carlos (SP): Universidade Federal de São Carlos; 2009.
- Clay MM. *The early detection of reading difficulties.* Portsmouth, NH: Heinemann, 1993.
- Davies R, Cuetos F, Glez-Seijas R. Reading development and dyslexia in a transparent orthography: a survey of Spanish children. *Ann. of Dyslexia.* 2007;57: 179-98.
- Germano GD, Pinheiro FH, Capellini SA. Desempenho de escolares com dislexia: programas de intervenção metalinguístico e de leitura. *Psi Argu (PUCPR).* 2012;30:75-87.
- Cossu G. Biological constraints on literacy acquisition. *Read and Writ.* 1999;11:213-37.
- Kellogg RT, Olive T, Piolat A. Verbal, visual, and special working memory in written language production. *Acta Psych.* 2006;124(3):382-97.
- Dias RS, Ávila CRB. Uso e conhecimento ortográfico no transtorno específico de leitura. *Rev Soc Bras Fonoaudiol.* 2008;13(4):381-90.
- Capellini SA, Lanza S. Desempenho de escolares em consciência fonológica, nomeação rápida, leitura e escrita. *Pró-Fono R Atual Cient.* 2010;22(3):239-44.

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