

Public education students' performance, with and without learning difficulties, in phonological awareness, in rapid identification, in reading and in writing¹

Desempenho de escolares de ensino público com e sem dificuldade de aprendizagem em habilidade fonológica, nomeação rápida, leitura e escrita

Performance des écoliers de l'école publique avec et sans difficulté d'apprentissage à l'habilité phonologique, de nomination rapide, de la lecture et de l'écriture

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ABSTRACT

Purpose: To characterize and compare the performance of students in the elementary education system - both with and without learning difficulties - in phonological awareness, rapid identification, reading and writing. **Methods:** Sixty students from the 2nd to 4th grades participated in the study. They were divided into six groups – each group was composed of 10 students and there were three groups of students without learning difficulties and three groups with difficulties. **As procedures** we used phonological awareness, rapid identification, oral reading and writing from dictation. **Results:** Superior development was highlighted in those without learning difficulties compared to those with learning difficulties. **Conclusion:** the students with learning difficulties presented a higher score in the time/speed task of rapid identification. Consequently, there was lower production in the activities of phonological awareness, reading and writing, when compared to students without difficulties. A relationship between rapid identification and lexical access was revealed as well as a relationship between visual discrimination, frequency of word occurrence and presentation of code identification. All are necessary in an alphabetic writing system such as the Portuguese language.

Index terms: reading, learning difficulties, educational status.

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RESUMO

Este estudo teve por objetivos caracterizar e comparar o desempenho de escolares do ensino público com e sem dificuldades de aprendizagem em habilidades fonológicas, nomeação rápida, leitura e escrita. Participaram desse estudo 60 escolares de 2ª a 4ª séries de escola de ensino particular, distribuídos em seis grupos, sendo cada grupo composto por 10 escolares, sendo três grupos de escolares sem dificuldades de aprendizagem e três grupos de escolares com dificuldades de aprendizagem. Como procedimentos, foram realizadas a prova de nomeação automática rápida, a de consciência fonológica e a prova de leitura oral e escrita sob ditado. Os resultados deste estudo evidenciaram desempenho superior dos escolares sem dificuldades de aprendizagem em relação àqueles com dificuldades. Os escolares com dificuldades de aprendizagem apresentaram maior relação velocidade/tempo em tarefas de nomeação e, conseqüentemente, desempenho inferior em tarefas de consciência fonológica, leitura e escrita de palavras isoladas quando comparados aos sem dificuldades de aprendizagem. Os escolares com dificuldades de aprendizagem apresentaram comprometimento na relação entre as capacidades de nomeação e automatização dos estímulos apresentados com a capacidade de acesso lexical, discriminação visual, frequência de uso dos estímulos e competição para a apresentação do menor tempo possível na nomeação dos códigos necessários para o estabelecimento do mecanismo de conversão fonema-grafema, exigido para a realização da leitura e escrita em um sistema alfabético como o português.

Palavras-chave: leitura, dificuldades de aprendizagem, escolaridade.

RÉSUMÉ

Cette étude a eu les objectifs de caractériser et de comparer la performance d'écoliers de l'enseignement public avec et sans difficulté d'apprentissage dans les habilités phonologiques, la nomination rapide, la lecture et l'écriture. 60 écoliers de 2^a à la 4^a années d'école d'enseigne particulier, distribués dans six groupes ont participé de cette étude, en étant chaque groupe composé par 10 écoliers, en étant trois groupes d'écoliers sans difficulté d'apprentissage et trois groupes d'écoliers avec des difficultés d'apprentissage. Comme procédures, ont été réalisées: la preuve de nomination automatique rapide, de la conscience phonologique et la preuve de lecture verbale et de l'écriture sous dictée. Les résultats de cette étude ont

prouvé la performance supérieure des écoliers sans difficulté d'apprentissage concernant ceux avec des difficultés. Les écoliers avec des difficultés d'apprentissage ont présenté plus grande relation vitesse/temps dans les tâches de nomination et, conséquemment, une performance inférieure dans des tâches de conscience phonologique, lecture et écriture de mots isolés quand comparés à ce sans difficulté d'apprentissage. Les écoliers avec des difficultés d'apprentissage ont présenté un dérangement dans la relation entre les capacités de nomination et d'automatisation des stimulations présentées avec la capacité d'accès lexical, de discrimination visuelle, de fréquence d'utilisation des stimulations et de concurrence avec l'utilisation d'un plus petit temps dans la nomination des codes nécessaires pour l'établissement du mécanisme de conversion phonème-graphème, exigée pour la réalisation de la lecture et de l'écriture dans un système alphabétique comme le portugais.

Mots clés: lecture, difficultés d'apprentissage, scolarité.

1. Introduction

Learning difficulties can be seen as obstacles or barriers faced by students during the learning process or the assimilation of proposed components. These difficulties may be temporary or lasting and also more or less intense. They can lead to students dropping out of school, low results and a delay in learning time. A specialist may be needed to help avoid failure (REBELLO, 1993; SMITH and STRICK, 2001).

A study by Pilati (1994) showed that only 43% of children entering the educational system finished the elementary level. Among these, only 13% do not fail along the way and are able to reach the eighth grade at the expected age. More recently, *data*, released by the National Institute of Education and Research (2002; 2004), revealed that 59% of the students at the elementary school level in the country live in circumstances deemed as critical or very critical concerning family income and that the rate of distortion in the grade-age ratio touches 39% of all students assessed. In

Brazil, there is no estimate of the prevalence of learning disabilities because this diagnostic category is not used within the educational system. However, the inability to read affects 2-8% of children in public schools (CIASCA, CAPELLINI, TONELOTTO, 2003).

In our educational reality, there is a gap in this previous diagnostic, filled by teachers in a competent and assertive way. Learning difficulties are not used as a label, but as an aid for the teachers to help develop a more appropriate teaching plan. This is accomplished through a survey of children's learning difficulties for the minimization of changes in reading, writing and in mathematical calculation (CAPELLINI, TONELOTTO, CIASCA, 2003).

This study compared the students' performance in relation to teachers' formal evaluation and opinion. The average of the group defined by the teachers as having poorer performance was below that expected for the class. This highlighted the fact that these professionals' opinions were essential in identifying problems related to education.

Recent studies show that children with learning difficulties may show changes in phonological awareness and in access to the mental lexicon. This is due to modifications at the different levels of information processing. For three decades, research has shown that the speed of identification stimuli is closely related to the speed of access to short-term memory and to phonological identification. This directly influences the development of reading and writing (WAGNER and al., 1997; SCHELTINGA, VAN DER LEIJ, VAN BEINUN, 2003; and PENINGTON CARDOSO-MARTINS, 2004; SPRUGEVICA HOJEN, 2003; VUKOVIC AND SIEGEL, 2006).

Children with reading difficulties have varied fluency and problems with reading comprehension as a result of changes in phonological awareness. They also have a low capacity for information storage in their working memory (VAN DER LEIJ, MORFIDI, 2006).

The mechanisms of language processing components are there to underpin development of the phonological consciousness. These components, i.e. phonological and working access to the mental lexicon and phonological processing, allow organization of language. Likewise, they are needed by the central executive component of our brain in order to accomplish any task. This includes phonological awareness and phoneme-grapheme association (AVILA and CAPELLINI, 2007).

On this basis, the study aimed to characterize and compare the performance of students, both with and without learning difficulties, in the public education system regarding their ability to learn in relation to: their phonological awareness, their rapid identification, their reading and their writing.

2. Methods

Subjects

The study included 60 students of both genders from second to fourth grades in public elementary schools in the city of Marilia, SP. The average age ranged from eight years and three months old to ten years and four months old. The students were distributed in the following groups:

Group I (GI): comprised of ten children in second grade without learning difficulty;

Group II (GII): comprised of ten students in third grade without learning difficulty;

Group III (GIII): comprised of ten students in fourth grade without learning difficulty;

Group IV (GIV): comprised of ten students in second grade with limited learning ability;

Group V (GV): comprised of ten students in third grade with limited learning ability;

Group VI (GVI): comprised of ten students in the fourth grade with limited learning ability.

The students were selected based on their academic performance over two consecutive grading periods. We considered that students with insufficient performance have learning disabilities and that students with sufficient performance were considered to be without learning difficulties.

In order to achieve a better treatment of *data* in this study, the distribution of students in the groups was attributed through statistical guidance. The age range of students was from eight to 12 years, 32 (53%) individuals were boys and 28 (47%) were girls.

We used the following procedures:

1° Informed consent forms were used in compliance with the National Health Council 196/96 resolution. Before the start of the evaluations, we selected the subjects and their parents or guardians signed an informed consent form giving us permission to conduct the study.

2° Rapid automatic naming: the selected students were submitted to the rapid automatic naming test (DENCKLA and RUDEL, 1974, adapted by FERREIRA, CAPELLINI, CIASCA, 2003). Comprised of subtests identifying colors, digits, letters and objects. The subtests are composed of five different *stimuli*, shown alternately in ten sequential lines, totaling fifty *stimuli*. Before the test began, the students received guidance on identifying the *stimuli* without errors in the fastest time possible. The students were informed that they would be timed from the test signal at the start.

3° Phonological awareness test: the procedure used was Phonological awareness test (CAPOVILLA and CAPOVILLA, 1998), consisting of ten subtests, each one with four items referring to skills of phonemic and syllabic synthesis verification, segmentation, manipulation and transportation; supra-phonemes such as rhyme and alliteration.

4° Proof of reading and writing ability: the procedures used were oral reading and writing from dictation (PINE, 1994). The test was comprised of two subsets of 48 real words and 48 invented words, totaling 96 words. They were used for lists in tests of oral reading and writing from dictation, and have been analyzed in a quantitative way, i.e., frequency of errors.

The results of this study were statistically analyzed in order to compare the performance between students with and without learning difficulties in phonological awareness, automatic assignment, rapid reading and writing skills. For statistical analysis between the groups the Mann-Whitney test was used and we also used the Wilcoxon test and the Friedman test to analyze the intragroup results. For statistical analysis and obtaining results, we used the Statistical Package for Social Sciences (SPSS) in version 10.0.

This study was conducted with approval of the Ethics Committee Research of the Faculty of Philosophy of the State University *Paulista* - FFC / UNESP / Marilia - SP, under the protocol number 2812/2003.

3. Results

Table I – Distribution of Averages of Academic Performance by students in group GI, GII, GII, GIV, GV and GVI in the subtests of RAN, PCF, Proof Reading and Writing in Oral Dictation.

	Habilites	GI	GII	GIII	GIV	GV	GVI
RAN	Color	60,9	44,7	43,5	75,7	56,3	66,9
	Word	36,9	24,6	25,3	54,5	37,7	35,5
	Numbers	37,2	28,0	25,6	51,6	33,7	34,8
	Objets	74,9	59,4	50,8	88,6	70,4	74,0

	SiS	0	0	0	0	0	0,5
	SiF	2,7	2,0	1,7	2,6	1,9	3,4
	SeS	1,0	0,2	0	2,3	2,3	1,2
	SeF	1,1	0	0,1	1,8	1,4	0,8
	Rim	0	0,1	0	0	0	0
PCF	Alit	3,4	2,7	2,1	4,0	3,6	3,0
	ManS	0,2	0,1	0	1,1	1,7	1,3
	ManF	1,3	0,1	0	2,6	2,4	1,1
	TrS	0,9	0,6	0	1,7	1,1	0,6
	TrF	3,5	2,6	1,5	4,0	3,5	3,9
	ET	14,1	8,8	5,4	20,1	18,2	15,8
	PRRAF	3,0	0,5	1,3	8,7	5,7	3,3
	PRgAF	2,1	0,4	0,4	6,3	5,2	2,0
Oral Reading	PRIrAF	5,5	1,5	3,3	10,7	9,0	7,0
	PRRBF	2,1	0,5	0,6	8,7	7,3	2,8
	PRgBF	5,3	1,0	1,2	10,8	8,5	5,4
	PRIrBF	1,8	1,0	0,4	9,2	6,8	2,4
	PIR	9,3	4,1	9,2	20,8	17,1	13,8

Written under dictation	PIRg	14,1	5,6	9,6	24,4	19,4	15,3
	PIIr	11,5	5,2	10,0	23,4	17,4	13,0
	PRRAF	4,1	2,0	1,5	9,8	9,0	3,0
	PRgAF	4,0	2,0	1,0	9,6	7,1	2,4
	PRIrAF	12,1	6,5	6,4	14,1	13,9	9,9
	PRRBF	8,1	1,8	1,7	13,1	10,8	4,3
	PRgBF	9,1	3,9	3,5	12,8	12,7	7,8
	PRIrBF	5,3	2,3	2,1	11,3	9,6	3,4
	PIR	13,0	8,1	6,0	25,4	21,8	13,4
	PIRg	26,0	19,3	17,1	28,9	24,4	24,2
	PIIr	20,0	12,9	10,9	28,3	22,0	19,3

Legend: SiS: Silábical Synthesis; SiF: Phonemic Synthesis, Rim: Rime; Alit: Aliteration; SeS: Syllabical Segmentation; SeF: Phonemic Segmentation; ManS: Syllabic Manipulation; ManF: Phonemic Manipulation; TrS: Syllabic Transposition; TrF: Phonemic Transposition; ET: Score Total; PRRAF: Real Regular High Frequency Words; PRgAF: High Frequency Real Word Rule; PRIrAF: High Frequency Irregular Real Words; PRRBF: Low Frequency Real Regular Words PRgBF: Low Frequency Real Rule Words; PRIrBF: Low Frequency Irregular Real Words; PIR: Invented Regular Words PIRg: Invented rule Words ; PIIr: Invented Irregular Words.

When comparing the groups' results, both with and without learning difficulties, using the Mann-Whitney, we found, as shown in table n°2, that students of G1 showed worse performance in identifying letters than students of GIV. They equaled GII's and GIV's performance in identifying colors and letters and also equaled GIII and GVI's performances in relation to identifying colors, letters, numbers and objects. In regard to phonological

ability, we found that GIV's students presented the highest average of errors in rhyme, syllabic manipulation, phoneme manipulation, phoneme transposition and an overall lower total score than GI. GV had a higher average of errors than GII in subtests of rhyme, alliteration, syllabic manipulation, phoneme manipulation, phoneme transposition and overall total score. GVI showed higher average of errors than GIII in subtests of synthesis, phonemic, rhyme, alliteration, syllabic manipulation, phoneme manipulation, phonemic transposition and overall total score.

Also in table nº2, we observed statistically significant elements when we compared GI's students' performances with that of GIV, GV, GII, GIII and GVI in oral reading of regular words, rules and high and low frequency words. We saw that the average number of errors in students' performance was lower for GI, GII and GIII than for the groups with learning difficulties. The exception was the category of invented words: the 4th grade students' group, both with and without learning difficulties, presented an average number of errors.

Table II – Distribution of the p-value referring to the performance of the students of the GI, GII, GIII, GIV, GV e GVI on RAN, PCF and Oral Writing Reading under spelling of words and imaginary words

Habilidades		GI X GIV	GII X GV	GIII X GVI
RAN	Cores	0,069	0,023*	0,007*
	Letras	0,017*	0,006*	0,003*
	Números	0,112	0,172	0,012*
	Objetos	0,325	0,131	0,005*
PCF	SIS	> 0,999	> 0,999	0,147

	SiF	0,555	0,634	0,002*
	Rim	0,040*	< 0,001*	0,001*
	Alit	0,212	0,005*	0,049*
	SeS	> 0,999	0,317	> 0,999
	SeF	0,147	0,179	0,112
	ManS	0,014*	0,005*	0,005*
	ManF	0,020*	0,001*	0,005*
	TrS	0,282	0,478	0,068
	TrF	0,030*	0,022*	< 0,001*
	ET	0,025*	0,001*	< 0,001*
Oral reading	PRRBF	0,007*	< 0,001*	0,035*
	PRRAF	0,032*	< 0,001*	0,004*
	PRirBF	0,003*	< 0,001*	0,011*
	PRirAF	0,003*	< 0,001*	0,004*
	PRgBF	0,012*	< 0,001*	0,004*
	PRgAF	0,022*	0,002*	0,020*
	PIR	0,011*	< 0,001*	0,048*
	PIir	0,004*	< 0,001*	0,044*
	PIRg	0,001*	< 0,001*	0,363

Written under dictation	PRRBF	0,012*	< 0,001*	0,030*
	PRRAF	0,002*	< 0,001*	0,091
	PRIrBF	0,054	0,001*	0,022*
	PRIrAF	0,009*	0,001*	0,009*
	PRgBF	0,025*	< 0,001*	0,017*
	PRgAF	0,004*	< 0,001*	0,070
	PIR	0,001*	< 0,001*	0,002*
	PIIr	0,268	< 0,001*	0,002*
	PIRg	0,001*	< 0,001*	< 0,001*

Legend: SiS: Silábical Synthesis; SiF:Phonemic Synthesis , Rim: Rime; Alit: Aliteration; SeS:Syllabical Segmentation; SeF:Phonemic Segmentation; ManS: Syllabic Manipulation; ManF: Phonemic Manipulation; TrS: Syllabic Transposition; TrF: PhonemicTransposition; ET: Score Total; PRRAF: Real Regular High Frequency Words; PRgAF: High Frequency Real Word Rule; PRIrAF: High Frequency Irregular Real Words; PRRBF: Low Frequency Real Regular Words PRgBF: Low Frequency Real Rule Words; PRIrBF: Low Frequency Irregular Real Words; PIR: Invented Regular Words PIRg: Invented rule Words; PIIr: Invented Irregular Words.

The test groups' performance based on dictation showed that GII had on average less errors than GV in all categories of regular, rules, irregular, and high and low frequency words. GI, GIV, GIII and GVI showed significant statistical differences in all categories, showing that students in the 2nd and 4th grades without learning difficulties had a lower average of errors than students with learning difficulties in the same grade. There is an exception in writing real, invented, irregular low frequency words and actual regular, rule, high frequency words respectively, where these groups had similar results.

Table n°. 3 shows the intragroup comparison averages concerning students' performance in the Rapid Automatic Naming Fast Test (RAN) in

relation to the subtests of colors, letters, numbers and objects. Applying the Wilcoxon test, we found statistically significant differences for colors and letters; colors and numbers; letters, numbers and objects; and objects in all groups. This shows that GI, GII and GIII students took less time in identifying them than GIV, GV and GVI students.

Table III- Distribution of the p-value (p) concerning the performance of the students of the GI, GII, GIII, GIV, GV e GVI concerning the sub- tests of colors , letters , numbers , objects of the test of Automatic Quick Naming (RAN):

Subtests	Groups					
	I	II	III	IV	V	VI
Colors X Letters	0,005*	0,005*	0,005*	0,008*	0,011*	0,005*
Colors X Numbers	0,005*	0,005*	0,005*	0,007*	0,008*	0,005*
Colors X Objects	0,008*	0,005*	0,008*	0,123	0,012*	0,407
Letters X Numbers	0,833	0,021*	0,833	0,326	0,213	0,550
Letters X Objects	0,005*	0,005*	0,005*	0,008*	0,012*	0,005*
Numbers X Objects	0,005*	0,005*	0,005*	0,008*	0,008*	0,005*

The intragroup comparison performed by the Wilcoxon test found that all groups showed better results in syllabic and phonemic skills of synthesis, targeting and implementation. This was demonstrated by statistically significant differences. There were no performance differences between groups concerning rhyme and alliteration (Table four).

Table IV – Distribution of the p-value (p) concerning the performance of the students

of the GI, GII, GIII, GIV, GV e GVI about the phonemic, over-phonemic and syllabic abilities on the PCF.

Subtests	Groups					
	I	II	III	IV	V	VI
SiS x SiF	0,010*	0,006*	0,007*	0,005*	0,004*	0,007*
Rim x Alit	> 0,999	0,157	0,317	0,129	0,103	0,206
SeS x SeF	0,004*	0,006*	0,017*	0,002*	0,003*	0,008*
ManS x ManF	0,026*	> 0,999	> 0,999	0,004*	0,038*	> 0,999
TrS x TrF	0,007*	0,007*	0,017*	0,007*	0,012*	0,005*

Legend: SiS: Syllabic Synthesis; SiF:Phonemic Synthesis, Rim: Rime; Alit: Aliteration; SeS: Syllabic Segmentation; SeF:Phonemic Segmentation; ManS: Syllabic Manipulation ; ManF: Phonemic Manipulation; TrS: Syllabic Transposition; TrF:Phonemic Transposition; ET: Score Total; PRRAF: Real Regular High Frequency Words; PRgAF: High Frequency Real Word Rule; PRIrAF: High Frequency Irregular Real Words; PRRBF: Low Frequency Real Regular Words PRgBF: Low Frequency Real Rule Words; PRIrBF: Low Frequency Irregular Real Words; PIR: Invented Regular Words PIRg: Invented rule Words; PIr: Invented Irregular Words.

In intragroup comparisons, using the Wilcoxon test, we found that GIII and GIV showed better performances in reading regular high-frequency words than low frequency words. GI, GIII and GIV had higher scores on actual irregular high frequency word reading. As evidenced by a statistically significant difference, GI and GVI had better performance for reading real rule high frequency words, as we see in Table n. 5.

Table V – Distribution of the p-value (p) concerning the performance of the students of the GI, GII, GIII, GIV, GV e GVI about the reading of real words

Words Category	Groups
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	I	II	III	IV	V	VI
PRRAF – PRRBF	0,150	0,739	0,047*	0,034*	0,552	0,121
PRIrAF – PRIrBF	0,005*	0,102	0,008*	0,040*	0,091	0,0078
PRgAF - PRgBF	0,012*	> 0,999	0,066	0,233	0,208	0,005*

Legend: SiS: Syllabic Synthesis; SiF:Phonemic Synthesis, Rim: Rime; Alit: Aliteration; SeS:Syllabic Segmentation; SeF:Phonemic Segmentation; ManS: Syllabic Manipulation; ManF: Phonemic Manipulation; TrS: Syllabic Transposition; TrF:Phonemic Transposition; ET: Score Total; PRRAF: Real Regular High Frequency Words; PRgAF: High Frequency Real Word Rule; PRIrAF: High Frequency Irregular Real Words; PRRBF: Low Frequency Real Regular Words PRgBF: Low Frequency Real Rule Words; PRIrBF: Low Frequency Irregular Real Words; PIR: Invented Regular Words PIRg: Invented rule Words; PIr: Invented Irregular Words.

In intragroup comparison, through the Wilcoxon Test, we found that GI and GIV's students showed better performance with invented words when read by the students and they showed better performance in reading regular words than irregular words. GIV performed better in reading regular rule, and GVI and GI performed better reading words that the rule invented as the *data* presented in table n.6.

Table VI – Distribution of the p-value (p) concerning the performance of the students of the GI, GII, GIII, GIV, GV e GVI about the reading of invented words.

Words Category	Groups					
	I	II	III	IV	V	VI
PIR x PIr	0,014*	—	—	0,018*	—	0,196
PIR x PIRg	0,121	—	—	0,027*	—	0,442
PIr x PIRg	0,017*	—	—	0,234	—	0,009*

Legend: SiS: Silábical Synthesis; SiF: Phonemic Synthesis, Rim: Rime; Alit: Aliteration; SeS:

Syllabical Segmentation; SeF: Phonemic Segmentation; ManS: Syllabic Manipulation; ManF: Phonemic Manipulation; TrS: Syllabic Transposition; TrF: Phonemic Transposition; ET: Score Total; PRRAF: Real Regular High Frequency Words; PRgAF: High Frequency Real Word Rule; PRIrAF: High Frequency Irregular Real Words; PRRBF: Low Frequency Real Regular Words; PRgBF: Low Frequency Real Rule Words; PRIrBF: Low Frequency Irregular Real Words; PIR: Invented Regular Words; PIRg: Invented rule Words; PIr: Invented Irregular Words.

When the intragroup performance comparison was made through intra-Test Wilcoxon, we found that the performance for writing real high and low frequency words was close. There was no significant statistical difference. We found, however, that GI, GII, GIII, GV and GIV' students showed statistically significant differences in real irregular words, they showed better performance for high frequency reading words than for the low frequency words. GI and GVI's students performed better on writing real rule high frequency words, as shown in table n. 7.

Table VII – Distribution of the p-value (p) concerning the performance of the students of the GI, GII, GIII, GIV, GV e GVI about the writing of real words.

Words Category	Groups					
	I	II	III	IV	V	VI
PRRAF – PRRBF	0,722	0,722	0,260	0,777	0,052	0,323
PRIrAF – PRIrBF	0,011*	0,009*	0,005*	0,167	0,018*	0,005*
PRgAF – PRgBF	0,011*	0,051	0,028*	0,149	0,005*	0,015*

Legend: SiS: Silábical Synthesis; SiF: Phonemic Synthesis , Rim: Rime; Alit: Aliteration; SeS: Syllabical Segmentation; SeF: Phonemic Segmentation; ManS: Syllabic Manipulation ; ManF: Phonemic Manipulation; TrS: Syllabic Transposition; TrF: Phonemic Transposition; ET: Score Total; PRRAF: Real Regular High Frequency Words; PRgAF: High Frequency Real Word Rule; PRIrAF: High Frequency Irregular Real Words ; PRRBF: Low Frequency Real Regular Words; PRgBF: Low Frequency Real Rule Words; PRIrBF: Low Frequency Irregular Real Words; PIR: Invented Regular Words; PIRg: Invented rule Words; PIr: Invented Irregular Words.

From the comparison of intra-group by the Wilcoxon Test, we observed that the GI, GII, GIV and GV's students had better performance in the regular than in the irregular invented written words. GI, GII, GIII, GV and GVI's students gave a better performance in regular writing word than rule, and in the irregular words than rule words.

(Table eight).

Table VIII – Distribution of the p-value (p) concerning the performance of the students of the GI, GII, GIII, GIV, GV e GVI about the writing of invented words.

Words Category	Groups					
	I	II	III	IV	V	VI
PIR x PIr	0,005*	0,005*	0,0058	—	0,005*	0,008*
PIR x PIRg	0,005*	0,012*	0,007*	—	0,008*	0,005*
PIr x PIRg	0,046*	0,005*	0,009*	—	0,007*	0,020*

Legend: SiS: Silábical Synthesis; SiF:Phonemic Synthesis, Rim: Rime; Alit: Aliteration; SeS: Syllabical Segmentation; SeF:Phonemic Segmentation; ManS: Syllabic Manipulation; ManF: Phonemic Manipulation; TrS: Syllabic Transposition; TrF: Phonemic Transposition; ET: Score Total; PRRAF: Real Regular High Frequency Words; PRgAF: High Frequency Real Word Rule; PRIrAF: High Frequency Irregular Real Words ; PRRBF: Low Frequency Real Regular Words PRgBF: Low Frequency Real Rule Words; PRIrBF: Low Frequency Irregular Real Words; PIR: Invented Regular Words PIRg: Invented rule Words; PIr: Invented Irregular Words.

4. Discussion

When a child reaches school age and moves into the classroom, she already has control of oral language. However, at that time, she is not aware of the communication between oral and written language particularly in regard to letter-sounds correspondence.

In order to learn the alphabetic system of writing, the combination of an auditory phonemic component with a visual graph component is required. To understand the alphabetic principle it takes three factors:

- 1° Science, where it is possible to target the spoken language in distinct units;
- 2° The understanding that these same units are repeated in different spoken words;
- 3° The notion of the rules of communication between graphemes and phonemes.

It is noteworthy that the first of these two factors are aspects of phonological awareness and this makes it indispensable in the development of reading and writing (MALUF BARRERA, 2003 and GUIMARÃES, 2003).

Perception of the phonemic structure of speech allows the child to use a system for converting spelling in generative phonology, thereby allowing the reading of a regular word involving the graph-phonemic correspondence. The characteristic of the generative spelling alphabet allows readers to learn by themselves, to find new words to which they can apply the phonological decoding rules. The decoding process contributes to phonological formation and the child is able through orthographic representation to decipher new words. The phonological process will allow the child to read through the lexical route (CAPELLINI, 2004, CAPELLINI, 2004B; VEUILLET et al., 2007).

Phonological process refers to the operation of information processing based on oral language. Phonological structure involves perception and memory work. When failure occurs in the phonological processing of information, analysis of the articulated word into its constituent parts, syllables and sounds, is impaired. This is due to the presence of deviations in the representation of phonics in short-term memory. This negatively influences aspects of speech and oral production of the text being read (CAPELLINI, 2004A; SALGADO and CAPELLINI, 2004; BARBOSA, 2005).

The findings revealed that students with learning difficulties, regardless of ranking and independent of their level in school, showed obstacles in accessing and retrieving the phonological information necessary for good performance on the tasks of oral reading and writing through dictation of words.

Regarding the performance of students in the RAN, the groups with students with no learning difficulties performed better than those of the groups with learning difficulties. In this study, we observed that the students of GI, GII and GIII showed better performance for color naming in relation to objects and, in general, they were also the fastest to name letters in relation to colors; numbers in respect to colors, letters in relation to objects and figures in relation to objects. The students without learning difficulties in GI, GII and GIII showed better performances for naming colors, letters, numbers and objects than the students with learning difficulties in GIV, GV and GVI. We also observed that they were faster in the naming of letters and numbers than the naming of color, since the assignment of stimuli requires attention to the processing of perceptual and visual lexicon of higher recovery extension, confirming the findings of (DENCKLA AND RUDEL, 1974; FERREIRA, CAPELLINI, CIASCA, 2003; SWANSON, HOWARD, SAEZ, 2006; CAPELLINI et al., 2007). Regarding performance of phonological awareness in school, we found that the students of all groups showed better performance in syllabic skills than in phonemic abilities, more specifically, best results in short segmentation and transposition of syllabic than phonemic.

In rhyme and alliteration, we found that students of the groups with learning difficulties demonstrated variations in their skill level. That allows us to consider that these students had gaps in perception of the initial and final sounds of the words, highlighting difficulties in grouping words that have phonological similarity. This shows us changes in the use of the working

memory, a disorder which jeopardizes the formation of new words from syllabic and phonemic segments that were known and acquired in early literacy (VAN DER LEIJ and MORFIDI, 2006; STEINBRINK, KLATTE, 2007).

Researchers agree that phonological awareness is important for reading, and that in most subjects with reading delays or with dyslexia, we identify changes in that skill. This hypothesis has been supported by several studies that show delays in the sensitivity to rhyme, phoneme segmenting, and alliteration during reading development (WOLF, BOWERS, BIDDLE, 2000; BOWERS and NEWBY-CLARK, 2002 and al., 2002, SAVAGE and al., 2005).

It was also realized that children had better performance in oral reading and writing through dictation of real words than of invented words and in high-frequency words over low frequency words and invented words than rule and irregular words. This corroborates what was cited by Snowling, Gallagher and Frith (2003), who said that the more auditory and visual perceptual contact children have with words, the more familiar these words become. In this way, the child can more easily read high frequency words than low frequency words, and also actual words better than fabricated words. In comparisons of real high frequency words with regular, irregular and rule, only GI, GIII, GIV and GVI had statistically significant differences. This shows us that these school groups perform better at reading high frequency words than at reading low frequency words. It indicates the need for formal teaching of spelling and reading incentives in the context of school and education.

In comparisons between the invented regular, irregular words and rule, only group GIV was not statistically significant. The fact that these students in the study had higher difficulty in reading invented words allows us to consider that there are changes in perception of the phonological

structure of words when these are already part of their visual vocabulary. This demonstrates the difficulty of phonological and spelling analysis of words while reading (SNOWLING, GALLAGHER, FIRTH, 2003, SNOWLING and STACKHOUSE, 2004).

In relation to written performance we observed that by speaking out loud in class, such as in oral reading, written performance is best with actual words that generally are described in literature than with invented regular and irregular high frequency word or low frequency words (CLARK-NEWBY and BOWERS, 2002, SAVAGE et al., 2005) who described how the lexicon of high-frequency grapheme is stored in the lexicon, thereby facilitating the development of error-free writing.

The findings of this study allow us to verify the relationship between the time allowed and the rapidity of naming, i.e. access to mental lexicon, phonological awareness, reading and writing. GI, GII and GIII made faster identifications in less time and therefore had higher phonological, reading and writing skills concerning the dictation of single words. GIV, GV and GVI made slower assignments at a longer speed in the same time period, thus they showed poorer performance on tests of phonological awareness, reading and writing based on dictation of single words. These findings confirm the results described in the literature (SWANSON, HOWARD, SAEZ, 2006).

These findings indicated that the speed of access to the mental lexicon is directly related to the ability of the phonological consciousness in reading and writing. School groups without learning disabilities showed faster time/speed ratios in naming tasks. Therefore, they had better performances in phonological awareness and in the activity of oral reading and writing from dictation of single words when compared to the groups with learning difficulties who showed longer time/speed ratios in identification tasks. The groups with learning difficulties showed poorer

performance on tasks of phonological awareness, reading and writing of isolated words.

The relationships established in this study between identification, speed and automation of *stimuli* allowed us the ability to access lexical and visual discrimination, frequency of the use of incentives and competition for presentation of the assignment of codes in the shortest time possible. These are necessary in establishing the conversion mechanism, phoneme grapheme, required in the performance of reading and writing in a letter writing system such as the Portuguese language.

The results of this study showed the relationship between identification, rapid automatic phonological awareness, and reading and writing. The students with learning difficulties had their rapid identification and phonological awareness altered. This was reflected in their lower performance in reading and writing these words (HOGAN, CATTS, LITTLE, 2005; VAN GOOD BOUWMANS, BROEDERS, 2006; PROTOPAPAS, SKALOUMBAKAS, 2007).

In Brazil, the profile of students with limited learning is of fundamental importance. The high proportion of students who have problems in phonological awareness and rapid identification causes some confusion with children who present the framework for developmental dyslexia. In fact, there is a failure of the school system to access information from phonological literacy problems.

There is a need for further studies in speech therapy and teaching in the investigation of phonological skills and of rapid identification in our schools. Some international literature considers they are good predictors of skills in the performance of reading and writing of a graphic system based on an alphabetical system (WOLF, BOWERS, BIDDLE, 2000, BOWERS and NEWBY-CLARK, 2002; SAVAGE et al., 2005). Therefore, this analysis could contribute by filling a gap that still exists in speech therapy and

education. It is the property profile of the good player, the bad player and the dyslexic, helping to avoid misdiagnosis and its consequences which generally affect the quality of childrens' lives in the family, social and educational context.

5. Conclusion

The results of this study allow us to conclude that the students of GI, GII and GIII showed better performances in consciousness, phonological awareness, in rapid identification, and in reading and writing of a series of isolated words. This shows improvement in the skills of reading and writing through exposure to classroom activities. However, it was not evident among the students of GIV, GV and GVI who showed no improvement in performance during the assessments and in the tests applied in this research. This indicates that, when they are presented, learning disabilities are not exceeded during the school ranking, triggering, along the literacy process, commitment and academic performance.

The students of GIV, GV and GVI with learning disabilities, showed slower speed/time relations in identification tasks, and consequently, lower performance on tasks of phonological consciousness, reading and writing of isolated words when they were compared to the students of GI, GII and GIII, who do not have learning difficulties. This reveals the relationship between assignment capabilities and automation of presented *stimuli*, and the ability to access lexical, visual discrimination, incentive uses, frequency and competition in presenting in the least possible time concerning the assignment of codes, in establishing the required conversion the mechanism phoneme grapheme, required to complete reading and writing in a graphics letter system such as the Portuguese language.

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