Original Article

Artigo Original

Reading comprehension of deaf students in regular education

Compreensão de leitura de alunos surdos na rede regular de ensino

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Keywords

Language
Reading
Readability
Hearing loss
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Language tests

ABSTRACT

Purpose: To evaluate and compare the reading comprehension of deaf students included in regular classrooms of public schools with and without specialized educational support. **Methods:** Observational analytic study with 35 students with sensorineural hearing loss, with and without educational support. All subjects were assessed with the Word Reading Competence Test (WRCT), the Picture-Print Matching Test by Choice (PPMT-C), and the Sentence Reading Comprehension Test (SRCT). **Results:** In the tests regarding comprehension of words (WRCT and PPMT-C), the results showed no difference in the performance of deaf students who attend and do not attend educational support. Regarding reading comprehension of sentences, the application of the SRCT also did not show differences between the groups of deaf students. A significant correlation was found between age and grade, indicating that the older the students and the higher their educational level, the better their performance in reading sentences. The results indicate that deaf students, regardless of attending educational support, read words better than sentences. **Conclusion:** There is no difference in reading comprehension between deaf students who receive and do not receive specialized pedagogical monitoring.

Descritores

Linguagem
Leitura
Compreensão de leitura
Perda auditiva
Fonoaudiologia
Testes de linguagem

RESUMO

Objetivo: Avaliar e comparar a compreensão de leitura de alunos deficientes auditivos inclusos nas classes regulares de escolas públicas com e sem apoio pedagógico especializado. **Métodos:** Trata-se de estudo observacional analítico com 35 alunos com perda auditiva neurossensorial, com e sem apoio pedagógico (Sala Apoio e Acompanhamento à Inclusão – SAAI). Todos foram submetidos ao Teste de Competência de Leitura de Palavras (TCLP), Teste de Nomeação de Figuras por Escolha de Palavras (TFN) e Teste de Competência de Leitura de Sentenças (TCLS). **Resultados:** Nos testes relativos à compreensão de palavras (TCLP e TFN), os resultados estatísticos não apontaram diferença no desempenho dos alunos deficientes auditivos que frequentam e não frequentam apoio. Em relação à compreensão de leitura de sentenças, a aplicação do TCLS também não mostrou diferença entre os grupos de alunos deficientes auditivos. Houve correlação significativa entre idade e série, indicando que quanto mais velho e maior o nível de escolaridade do aluno melhor será seu desempenho na leitura de sentenças. Os resultados apontam que alunos deficientes auditivos, independentemente da frequência ao apoio (SAAI), leem melhor palavras do que sentenças. **Conclusão:** Não há diferença na compreensão de leitura entre os alunos deficientes auditivos que recebem e não recebem acompanhamento pedagógico especializado.

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INTRODUCTION

Reading and writing are basic objectives of the school. In this environment, the ability to learn must be developed, and the primary means are full mastery of reading, writing and calculation, as indicated by *Lei de Diretrizes e Bases da Educação* (Act 9394/96, Education law).

Reading is to assign a meaning. It is also a process of interaction between reader, author and text[1]. The comprehension of a text involves making connections between the ideas and the relevant knowledge previously acquired, among which we highlight the linguistic cognizance, the textual perception and the world knowledge[1,2].

For the reading and writing skills to develop, an extensive learning is necessary. When we refer to the learning of students with hearing impairment this path can be even more complex because they have sensory deprivation that may be associated with delayed language acquisition and development[3,4].

Nevertheless, Brazilian law (Act 9494/96, Resolution CNE/CEB 2/2001 and Resolution 10/2010) points to the inclusion of all students in the regular school system. Thus, individuals with hearing disability must also attend regular teaching school.

However, studies on education show that even after a long period of education, hearing impaired people have difficulties in reading and writing[5,6], which raises questions regarding the organization of support services as well as the availability of specialized professionals for the new demands that come with universal access to regular education[5,6].

This study had the aim to evaluate and compare the reading comprehension of deaf students (DS) included in regular classrooms in public schools, with and without specialized pedagogic support (*Sala Apoio e Acompanhamento à Inclusão* – SAAI).

METHODS

This study was approved by the Institutional Board Review of the Universidade Federal de São Paulo, under protocol number 1991/09. To carry out the reading assessment, the local Regional Board of Education was consulted and, after the authorization was given, presentation of the objectives and methodology of the study were explained to students enrolled in classrooms eligible for the study. In addition, parents and/or guardians signed the consent forms for subsequent completion of reading assessment.

From the data analysis of students enrolled in public schools in the southern region of São Paulo, 115 hearing-impaired/deaf students were identified, of whom 65 were enrolled in Elementary School and allocated in 35 different schools. The group of students actually investigated consisted of 35 students with hearing disabilities and 71 students with normal hearing, all belonging to the same classrooms, in order to have a control group (parameter).

Inclusion criteria were as follows: bilateral hearing loss of any degree confirmed by audiometric test (obtained in the archives of the school units), and absence of neurological and/or psychiatric conditions previously identified.

Students with hearing impairment were divided into two groups. The first consisted of 16 subjects who attend the *Sala de Apoio e Acompanhamento à Inclusão* (SAAI, Monitoring and Support Towards Inclusion Room), and the second by 19 participants who do not attend the support room.

Of the students who attended the support room (SAAI), eight (50.0%) were in the first cycle of Elementary School, and eight (50%) in the second cycle. Of the students who do not attend SAAI, eight (42.8%) were in the first cycle of the Elementary School, and 11 (57.9%) in the second cycle.

Data on history of hearing loss, general health of the students, predominant type of communication, history of use of hearing aids (individual sound amplification devices, ISAD), history of speech and language therapy and activity report in the Monitoring and support toward inclusion room (SAAI) were collected from the records of the school units.

Regarding the types of hearing loss, in the group attending the SAAI, seven subjects (43.7%) had moderate hearing loss, six (37.5%) had severe loss (18.7%), and three, profound loss. In the group that did not attend the SAAI, five (23.5%) had mild hearing loss, three (15.7%) moderate loss, five (26.3%) severe loss and six (31.5%) profound loss. Only two (5.7%) of the students with hearing loss were treated by a language and hearing therapist, and only four (11.4%) used unilateral behind-the-ear hearing aids and three (8.5%) used bilateral ones.

Students with normal hearing were considered in the survey since we observed in the schools evaluated that deaf students are introduced to the learning contents without adaptations. Therefore, it was necessary to determine if the hearing classmates were learning the contents differently. Hearing students were selected in classrooms where there were also deaf students, in the ratio of 2:1, in order to establish a parameter. Hearing students with history of learning disabilities or another type of handicap were excluded from the study.

All students were tested with three instruments developed and validated to Brazilian Portuguese for deaf and hearing children, theoretically based on information processing[7-9]:

- Word Reading Competence Test (WRCT): assesses the degree of development of silent reading in students in elementary school. This test allows us to observe if students can correctly discriminate between words and non-words[7].
- Picture-Print Matching Test by Choice (PPMT-C): assesses the development of the ability to name figures through choice of written words. The test consists of 36 items, each of which has a model figure flanked by four written words as choice alternatives. These four alternatives consist of a word that matches the target image and three distracting words, which induce reading misapprehension (paralexia). The maximum score of the test is 36 points being assigned one point for each correct correlation[8].
- Sentence Reading Competence Test (SRCT): assesses the development of the ability to extract meaning from sentences of varying complexity. It consists of 40 items, each organized with a sentence and five alternative figures, one of which corresponds to the meaning of the sentence. The other four figures are distractive, i.e. are not applicable figures or refer to smaller segments of the sentence. The function

of the distracting figures is induce error arising from the incomplete reading and understanding of the meaning and thereby allows the detection of failure in syntactic processing. To evaluate the performance in the test, each sentence correctly answered scores one point, and the maximum score is 40 points[9].

The instruments were previously presented to students, orally and in groups for the listeners, and individually for deaf students who used the oral language and through Brazilian Sign Language – LIBRAS (*Língua Brasileira de Sinais*) for deaf students who used this language for communication.

All instruments have a training stage, which was run to each group of students before the reading assessment for familiarization with the tool, as recommended by the author[7-9]. Application of the tests was carried out at the classroom or at the school's reading room, and students were accommodated in individual desks.

All collected data were transcribed into a database developed in MS Excel. The frequency of the variables investigated and the associations were tabulated, where relevant, as well as mean, median and standard deviation. Statistical analysis was performed using the Spearman Correlation test, Kruskal-Wallis and Mann-Whitney. The significance level was set at 0.05 (5%) and confidence intervals constructed throughout the work were 95%.

RESULTS

The characterization of the students was performed (Table 1).

We obtained data concerning the performance of deaf students in the classroom according to the frequency of use of SAAI and the performance of the parameter group (listeners) according to WRCT, PPMT-C and SRCT tests (Table 2). There was no difference in the percentage of correct responses between groups of deaf students who attend or not the support room.

The correlation analysis showed that the higher the student's age and education, the better their performance in the WRCT, PPMT-C and SRCT tests (Table 3).

Table 1. Characterization of deaf students studied in relation to hearing loss, type and mode of communication, use of ISAD, speech and language therapy history, year of the cycle and attendance in SAAI

	Degree of hearing loss							
	Mild		Moderate		Severe		Profound	
	n	%	n	%	n	%	n	%
	4	11.4	6	17.1	11	31.4	14	40
Type of communication								
Oral	4	100	6	100	6	54.5	-	-
Oral/gestural	-	-	-	-	5	45.5	10	71.4
LIBRAS	-	-	-	-	-	-	4	28.6
Use hearing aids								
No	3	75	6	100	11	100	8	57.2
Unilateral	1	25	-	-	-	-	3	21.4
Bilateral (or binaural)	-	-	-	-	-	-	3	21.4
Receive speech-language therapy								
No	4	100	6	100	11	100	12	85.7
Yes	-	-	-	-	-	-	2	14.3
Attend SAAI	0	0	5	83.3	5	50	6	42.8
Years of the cycle								
Students in cycle I								
2nd, 3rd, 4th	-	-	5	83.3	2	12.5	1	6.25
Students in cycle II								
5th, 6th, 7th	-	-	2	12.5	4	25	2	12.5
Students with SAAI								
Students in cycle I								
2nd, 3rd, 4th	2	10.5	-	-	2	10.5	4	21.0
Students in cycle II								
5th, 6th, 7th	3	15.7	3	15.7	3	15.7	2	10.5

Note: SAAI = Monitoring and support towards inclusion room

Table 2. Comparison of groups as percentage of accuracy on tests of reading competence

Test	Mean	Median	SD	n	CI	p-value
WRCT						
DS with support	70.7	74.3	17.9	16	8.8	
DS without support	67.2	75.7	25.4	19	11.4	<0.001*
Parameter (control group)	84.5	90.0	15.9	71	3.7	
PPMT-C						
DS with support	76.0	86.1	24.9	16	12.2	
DS without support	70.5	94.4	33.4	19	15.0	<0.001*
Parameter (control group)	91.6	97.2	16.3	71	3.8	
SRCT						
DS with support	34.7	28.8	31.3	16	15.3	
DS without support	49.7	40.0	37.5	19	16.9	<0.001*
Parameter (control group)	75.7	90.0	32.3	71	7.5	

* Significant values (p≤0.05) – Kruskal-Wallis test

Note: SD = standard deviation; WRCT = Word Reading Competence Test; PPMT-C = Picture-Print Matching Test by Choice; SRCT = Sentence Reading Comprehension Test; DS with support = deaf students who attend SAAI; DS without support = deaf students who do not attend SAAI; SAAI = Monitoring and support toward inclusion room

Table 3. Correlation among grade (year of the cycle), age and reading competence in hearing-impaired students

Hearing disabled		Grade	Age	PPMT-C	WRCT
Age	Corr	76.2%	-	-	-
	p-value	<0.001*	-	-	-
PPMT-C	Corr	44.6%	3.8%	-	-
	p-value	0.007*	0.827	-	-
WRCT	Corr	55.2%	17.6%	83.6%	-
	p-value	0.001*	0.312	<0.001*	-
SRCT	Corr	54.2%	18.0%	54.2%	64.8%
	p-value	0.001*	0.301	0.001*	<0.001*

* Significant values (p≤0.05) – Spearman Correlation test

Note: WRCT = Word Reading Competence Test; PPMT-C = Picture-Print Matching Test by Choice; SRCT = Sentence Reading Comprehension Test.

DISCUSSION

The data initially collected to define the study population (hearing-impaired/deaf students enrolled in local schools) indicate difficulty of the educational institution to register and identify the types of students they work with. These aspects possibly hinder actions that aim to provide qualified support for the specific needs inherent to hearing loss and the possible difficulties to learning inherent to this sensory deprivation, besides the effective integration of the child with the school community[10,11].

With regard to the characteristics of the study population, the prevalence of oral communication deserves to be highlighted, followed by oral communication associated with indicative gestures. Furthermore, although the oral communication is the main form of expression, only a small percentage of these students used ISAD and most students were not receiving speech and language therapy. This is relevant when considering a significant difficulty in understanding the contents introduced in school since lessons prioritize oral communication for teaching the curricular program[10,12-17].

Moreover, several authors advocate that the hearing-impaired should have early access to sign language and in order that their communication is effective, it is necessary that everyone – family, teachers and classmates – is motivated to use the same language[1]. In the absence of fluency needed for communication of hearing-impaired children in school, the teacher will face more obstacles to foster the literacy and the student will be unable to acquire the skills of reading and writing, which can compromise their the linguistic, educational and therefore professional development[15].

The current law, federal or local, points out the Monitoring and support toward inclusion room (SAAI) as a crucial space for pedagogical work more specific and targeted to deaf students, since it is possible to solve the doubts and deepen knowledge, whether using LIBRAS or using oral communication[18]. In the study population less than half of students in regular classrooms attended SAAI, an aspect that may be related to the shortage of specialized human resources, of vacancies for this type of care (lack of access) or even failure in selection and indication

of this type of activity for the students included in the regular school system.

There was no difference in reading comprehension tests between groups of pupils attending or not SAAI. Despite the fact previously mentioned, we observed during the application of tests that students attending a support room (SAAI) have greater fluency in communication, whether oral or LIBRAS, which also promote subsidies for them to understand more complex sentences and texts. This is possibly explained by the fact that reading comprehension requires, among other things, decoding vocabulary knowledge, memory and inference[12.19]. In addition, it is observed that students who were not attending SAAI have greater difficulty in understanding more elaborate statements.

Also noteworthy is the finding related to reading which shows that deaf students read better words than sentences regardless of attendance to SAAI. This result is indicative of the difficulty of effective communicative interaction between students and teachers, which is possibly an obstacle to learning written language. This statement is corroborated by the relevance of meaning construction and generalization of words in different contexts[11,12], which does not occur when reading word for word is not possible, as in the tests used in this study[20,21].

The topics highlighted above are reaffirmed by superior reading results of hearing students with education similar to the hearing-impaired ones, who underwent the same instruments. Although students with normal hearing have not reached the level of total correct responses, learning through orality and without sensory deprivation allows satisfactory reading performance.

The Sentence Reading Competence Test (SRCT) indicates that both students with hearing loss and listeners had greater difficulty in understanding the written text. The result is consistent with studies showing that the decoding and comprehension skills are necessary to understand a written text. When a child learns to read he or she decodes words, what does not mean he or she understands the text being read[19,22-27].

In the assessment of reading comprehension of sentences, we observed that the deaf and hearing students show greater ability to decode but do not understand their statements[24]. In this result, there is a distinct correlation, since the year of the cycle is an intervening factor in the outcome. The Sentence Reading Competence Test evaluates the syntactic processing of sentences, which requires different skills of the students in the PPMT-C e WRCT tests[9,26].

The performance on tests showed positive correlation with school grade. The result suggests a mismatch between the listeners and hearing-impaired students, even though the listeners have also shown weaknesses in the reading process.

This finding confirms the position of some authors[28-30] on the fact that the hearing-impaired pupils can learn with relative ease decoding of graphic symbols, however, have difficulties in understanding the text in its deeper construction. There is a distinct correlation, since the year of the cycle is an interfering factor in the result[1,2]. A correlation analysis on the age/cycle showed that the greater the age and education level, the better the test scores[26]. This result can be explained by how students learning occurs, primarily through single words[9,28-30].

Whilst this study brings important systematic information about the process of school inclusion and its impact on reading comprehension, there are limitations regarding the lack of updated and relevant information about the student in school as well as his or her past school history and specialized treatment(s) that were or are received. These issues deserve attention and may be modified by the incorporation of a continuum that allows parents and teachers to systematically update the data of students in the school routine. The standardized health datasheet consulted for the study and available in schools of the city of São Paulo has some vague information and many fields not fulfilled, possibly because that information is generally recorded by the school office staff, who do not know specifically the relevance of data that should be archived. A study on this topic indicated that teachers have little information about these students and reported that even when data are available it is difficult to give meaning to information from medical documents, or even qualify the information given by families without no confirmation document[27].

From the observations, it is clear that there is need for significant changes in the structure of regular education to receive and provide effective education for students with hearing impairment, as noted in previous studies[28-30]. The potential contributions to change this scenario are specific training for teachers who work directly with deaf students, aiming at the modification of teaching practice, and the inclusion of a professional translator and interpreter in the classroom.

CONCLUSION

Students with hearing disabilities included in the regular school system, attending or not the Monitoring and Support toward Inclusion Room, have better understanding in reading words than in reading sentences. The data indicate that there is no difference in reading comprehension between deaf students who receive and do not receive specialized educational support.

It appears that there is little information on the peculiarities of the hearing-impaired student, hindering a more detailed knowledge of the teacher over the student's history. Teachers know little about hearing impairment/deafness, which restrain the creation of meaningful learning situations, less mechanical and more interactive, in order to implement actions for literacy and, consequently, for the development of reading and text comprehension.

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