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Artigo Original

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Relation among the knowledge of teachers about hearing loss degree, technological devices and communication strategies

Relação entre o conhecimento dos professores sobre grau de perda auditiva, dispositivos tecnológicos e estratégias de comunicação

Keywords

Hearing Loss
School Teachers
Cochlear Implant
Hearing Aids
Communication

ABSTRACT

Purpose: To analyze the relations among the knowledge of teachers about hearing loss degree, technological devices, hearing aids (HA), cochlear implant (CI), frequency modulation system (FM), and communication strategies. **Methods:** Forty-two (42) teachers that taught students with hearing impairment participated in this study. This sample included 24 middle school teachers, 11 elementary school teachers, and 7 preschool teachers, whose taught in the second semester of the school year and in the first semester of the following year. The data was obtained through the Knowledge and Experience Questionnaire developed by Delgado-Pinheiro & Omote (2010). The questionnaire answers were categorized, and the frequency of occurrence was analyzed. Statistical analysis was performed using the chi-square test. **Results:** There was a statistically significant difference between the answers which showed that the teachers do not know about the degree of hearing loss, but they modify the communication strategies to keep the attention of the students. In addition, the results also showed that teachers do not know the technological devices and communication strategies most appropriate for the student with hearing impairment. **Conclusion:** The results showed that teachers do not have sufficient knowledge about hearing impairment and as a result they modify their communication strategies for the student, even though they are unaware of the most appropriate communication strategies.

Descritores

Perda Auditiva
Professores
Implante Coclear
Auxiliares de Audição
Comunicação

RESUMO

Objetivo: Analisar a relação entre o conhecimento dos professores sobre grau de perda auditiva, dispositivos tecnológicos, aparelho de amplificação sonora individual (AASI), implante coclear (IC) e sistema de frequência modulada (Sistema FM) e estratégias de comunicação. **Método:** Participaram deste estudo 42 professores que atuavam com alunos com deficiência auditiva (DA), os quais lecionaram no segundo semestre do ano letivo e no primeiro semestre do ano subsequente, correspondendo a 24 professores do Ensino Fundamental II, 11 do Ensino Fundamental I e sete da Educação Infantil. Os dados foram obtidos através do Questionário sobre Conhecimentos e Experiências, desenvolvido por Delgado-Pinheiro e Omote (2010). As respostas dos questionários foram categorizadas, e analisada a frequência de ocorrência. A análise estatística foi realizada, utilizando-se o Teste de Qui-quadrado. **Resultados:** Houve diferença estatisticamente significante entre as respostas, as quais demonstraram que os professores não conhecem o grau da perda auditiva, mas modificam as estratégias de comunicação, para manter a atenção do aluno. Além disso, os resultados também revelaram que os professores não conhecem os dispositivos tecnológicos e estratégias de comunicação mais adequadas para o aluno com DA. **Conclusão:** Os resultados indicaram que os professores não apresentam conhecimentos sobre deficiência auditiva, porém, modificam suas estratégias de comunicação diante do aluno, mesmo não tendo conhecimentos sobre quais são as estratégias de comunicação mais apropriadas.

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INTRODUCTION

The technological advancement with regard to devices for accessing speech sounds, hearing aids (HA) and cochlear implant (CI), has enabled the development of oral communication for children with hearing impairment (HI)[1]. Another technological device that is considered a feature of hearing accessibility is the modulated frequency system (FM system), which consists of a device capable of bringing better quality to the perception of speech sounds in an environment with noise, reverberation and distance[2,3].

Access to these devices, as well as the possibility of early diagnosis by Neonatal Auditory Screening and Intervention, was ensured by the advances in current legislation in the country[4-7].

Students with hearing impairment do not form a homogeneous group and present different educational needs. They are part of the group of students with hearing impaired children and adolescents who can use oral communication in the school context.

Several factors interfere with the development of these children, such as time of diagnosis, type and degree of hearing loss, access to speech sounds with high-tech devices (HA or CI), time of sensory deprivation, participation in rehabilitation programs, family participation, among others. The impact of these factors on the communicative performance of children with hearing impairment was studied, and the results demonstrated that the length of device use, the degree of hearing loss, the chronological age and the consistency in the use of the device had greater influence[8]. Also the period between diagnosis and intervention is significant in the development of oral communication, in such a way that the faster the intervention, the better the results[9,10].

Thus, the group of students with hearing impairment can have their development impacted by the above-mentioned factors, with regard to hearing and language skills.

At school, the child is confronted with several factors that impact his academic performance, such as noise in the school environment, the distance between the teacher and the student with HI (speaker-listener), the reverberation in the classroom and the excess of pupils in the same classroom, with little or no acoustic treatment. The literature also shows that the guidelines to teachers, regarding the use of technological devices, are scarce[11]. In addition, the communication strategies used by the teacher may make it easier or more difficult to understand on the part of the student with hearing loss.

From the implementation of the Decree 1,274/GM/MS[6], students with hearing loss, who meet specific criteria, may be candidates to receive the Modulated Frequency System as a technological resource to access speech sounds in the school environment. The use of technology, without the understanding by the teacher on the development of the hearing and language skills of their student with hearing impairment will not be sufficient for the academic success of this child or adolescent.

It is important to emphasize that, in addition to technological resources, family involvement, an appropriate therapeutic program and actions with the school are necessary[12]. In the school environment, the teacher plays an indispensable role, because it is these professionals who will be with the child with hearing impairment at important moments of their development.

The use of appropriate technological devices and the use of communication strategies in the school environment, such as speaking slowly, talking close to the student, placing the student's desk close to the teacher in the classroom, will enable the understanding of this student in relation to the teacher's speech and the pedagogical content.

The conduct of teachers with the hearing impaired student is influenced by the knowledge they have in relation to the subject of hearing impairment, and it is this knowledge that will impact the school life and the social insertion of that student [13,14].

In recent years, there have also been modifications in the legislation in the field of education and emphasis on actions to carry out the inclusion of students with disabilities in regular education. For the implementation to happen effectively, the professionals involved must understand the actions of the planned policy[15]. This way, for students with hearing impairment to develop in the school environment, there is a need for continuous monitoring of important factors in the learning process, among them the effectiveness of communication.

In view of the need for information to subsidize the joint actions of the areas of Health and Education, this study was intended to analyze the relationship between the knowledge of teachers on the degree of hearing loss, technological devices (HA, IC, FM system) and communication strategies.

METHODS

This study is part of a project approved by the Research Ethics Committee of Faculty of Philosophy and Sciences, São Paulo State University (UNESP – Marília), under the ruling No. 55494916.2.0000.5406. The participants were included in this survey only after signing the Free and Informed Consent Term. This is a Cross-sectional study.

There were 42 teachers working with hearing impaired students that participated in this study. This group consisted of teachers who taught in the second semester of the school year and in the first semester of the following year, where 24 were middle school teachers, 11 elementary school teachers and seven children's education teachers.

The inclusion criterion adopted was the teacher to have taught children with HA or CI, who used oral communication and who were attending or had attended the process of speech rehabilitation therapy, excluding the teachers that taught students who used exclusively the Brazilian Sign Language (LIBRAS) or who possessed multiple deficiencies.

The data were obtained through the Knowledge and Experience Questionnaire developed by Delgado-Pinheiro and Omote[16]. The questionnaire consists of questions related to the knowledge of teachers on hearing loss, resources for the use of auditory residues, degrees of hearing loss, strategies made to explain the content in the classroom, in addition to questions regarding the opinion and role of the teachers, as to the development of the hearing-impaired student. In this study, questions regarding teachers' knowledge of hearing loss, technological devices and communication strategies were analyzed.

The questionnaires were delivered in pre-scheduled meetings, carried out with the teacher and pedagogical team responsible

for the municipal and state education networks. The meetings took place in the participating schools or at the Municipal Department of Education. In the impossibility of the attendance of the teacher, the questionnaire was submitted directly to those schools. They were answered by the teachers in writing and in an articulate manner.

The answers to the questionnaires were categorized and the frequency of occurrence was analyzed. The categorization followed the criteria proposed by Omote[17]: not contain greatly differing occurrences within the same category; exhaustive categories to cover the whole speech under review; sufficiently exclusive categories so as to not include the same occurrence in two or more categories; sufficiently objective categories to ensure good trust; and relevant categories in order to be adapted to the content and to the purpose of the analysis.

Statistical analysis was carried out using the chi-squared test and admitting itself as a level of significance ($p < 0.05$).

RESULTS

The results show that 47.6% of the teachers know the degree of hearing loss of the student and 52.4% do not know, thus there is no statistically significant difference in this aspect ($P = 0.663$).

Table 1 shows the relationship between knowledge about the degree of student hearing loss, the use of communication strategies (to keep the child's attention, to communicate with the child, resources that assist in communication and to explain the content and when the student does not understand), and the appropriate environment and distance.

Among the factors pointed out, a statistically significant difference is observed for the relationship between the knowledge of the degree of student hearing loss and the use of communication strategies to keep the attention of the student with hearing impairment in the classroom ($p = 0.008$), in other words, although the group of teachers does not know the extent of the hearing deficiency, it reports changing the communication strategy to maintain the attention of that student.

Although no statistically significant difference has been found, when questioned about the resources that assist in communicating with the hearing-impaired student, 17% of the teachers point out "communication strategies", 74% indicate "non-pertinent" responses and 10% refer to "didactic resources", demonstrating that the lack of knowledge of communication strategies is prevalent.

However, the group of teachers refers to changing the communication strategies to communicate with the student (60%), in order to get the child's attention (50%), to explain the content (60%) and when the student does not understand (74%).

As for the most appropriate environment to communicate with the student with hearing impairment, 57% of the teachers declare not to know and 43% report "silent" environments; there was no observed statistically significant difference between this aspect and the knowledge about the degree of hearing loss of their student ($p = 0.108$).

Table 1. Relationship between the knowledge of the degree of the student's hearing loss, communication strategies, environment and distance

Communication strategies/Environment/Distance		Know the degree of the student's hearing loss						p-value
		No		Yes		Total (%)		
		N	%	N	%	N	%	
Child's attention	Change the strategy	6	27%	15	75%	21	50%	0.008*
	Don't change	15	68%	5	25%	20	48%	
	Not Pertinent	1	5%	0	0%	1	2%	
How to communicate with the child	Change the strategy	10	45%	15	75%	25	60%	0.125
	Don't change	11	50%	5	25%	16	38%	
	Not Pertinent	1	5%	0	0%	1	2%	
Know the resources that aid in communication	Communication strategies	5	23%	2	10%	7	17%	0.542
	Not Pertinent	15	68%	16	80%	31	74%	
	Teaching resources	2	9%	2	10%	4	10%	
Explaination of the contente	Change the strategy	11	50%	14	70%	25	60%	0.321
	Don't change	10	45%	6	30%	16	38%	
	Not Pertinent	1	5%	0	0%	1	2%	
When the student does not understand	Change the strategy	15	68%	16	80%	31	74%	0.668
	Don't change	4	18%	2	10%	6	14%	
	Not Pertinent	3	14%	2	10%	5	12%	
Know the environment to speak with the student	Not Pertinent	10	45%	14	70%	24	57%	0.108
	Silence	12	55%	6	30%	18	43%	
Know the distance to speak with the student	No	21	95%	18	90%	39	93%	0.493
	Yes	1	5%	2	10%	3	7%	

* Significant values ($p<0.05$) = Chi-Square Test

In relation to the appropriate distance to communicate with the student, 93% of the teachers declare to be unaware of this factor and only 7% of these presented answers that indicate knowledge (p = 0.493).

The results also showed that 81% of the teachers had no knowledge about the devices used by the hearing-impaired students, whereas 19% said they did (p < 0.001).

Table 2 shows the relationship between the teachers' knowledge of the technological devices used by the student (HA, CI, FM System), the degree of student hearing loss, the communication strategies (to communicate with the student and the knowledge about the resources that assist in the communication), the appropriate environment and distance and the verification of the device.

There is a tendency to statistical significance in the relationship between the knowledge about the technological devices used by the student with the other two factors: knowledge about the degree of hearing loss of his student (p = 0.085) and the change of communication strategies by the teacher when communicating with their student (p = 0.095).

When questioned about the most appropriate environment to communicate with the hearing-impaired student, 57% of the group reported not knowing and 43% indicated "silent" environments (p = 0.257).

The results also show that although statistically significant difference has not been observed for the relationship between knowledge about the appropriate distance to communicate with the student and the knowledge about the devices, there is the predominance in the lack of knowledge of the appropriate distance (93%), where only 7% of teachers refer to it (p = 0.513).

In addition, 55% of teachers report that they should not check their students' devices, 36% of teachers claim that verification should be performed and 10% had non-pertinent responses (p = 0.220).

DISCUSSION

The study sought to analyze the relationship between the knowledge of teachers about the degree of hearing loss, technological devices (HA, CI, FM System) and communication strategies.

In regard to the knowledge of the teacher about the degree of hearing loss of their student, it was found that, although the results did not find statistically significant difference, 52.4% of the participants demonstrated they did not know the degree of loss.

Delgado-Pinheiro et al.[12] emphasize that one of the relevant aspects to be discussed with teachers, in relation to the hearing deficiency, is the degree of hearing loss of their student and what this represents to their development of language and learning. The authors emphasize, in another study, that the knowledge of teachers about the degree of hearing loss and the impact that this causes for the child in relation to hearing and communication skills, is a primordial condition, because it will influence the academic development of this student[16].

As to the knowledge about the technological devices and communication strategies that assist the student with hearing impairment in the school context, the teachers revealed that they did not know the aforementioned devices and did not present any answers substantially different in most of the issues related to communication strategies.

In the last decade, there have been different advances in legislation that enable the hearing-impaired child to have access

Table 2. Relationship between the knowledge of the devices, degree of loss, communications strategies, environment, distance and verification of the device

Degree of loss/Communication strategies/Environment/Distance/Verification of the devices		Know about the devices						p-value
		No		Yes		Total (%)		
		N	%	N	%	N	%	
Know the degree of the student's hearing loss	No	20	59%	2	25%	22	52%	0.085
	Yes	14	41%	6	75%	20	48%	
How to communicate with the child	Change the strategy	20	59%	5	63%	25	60%	0.095
	Don't change	14	41%	2	25%	16	38%	
	Not Pertinent	0	0%	1	13%	1	2%	
Know the resources that aid in communication	Communication strategies	6	18%	1	13%	7	17%	0.523
	Not Pertinent	24	71%	7	88%	31	74%	
	Teaching resources	4	12%	0	0%	4	10%	
Know the environment to speak with the student	Not Pertinent	18	53%	6	75%	24	57%	0.257
	Silence	16	47%	2	25%	18	43%	
Know the distance to speak with the student	No	32	94%	7	88%	39	93%	0.513
	Yes	2	6%	1	13%	3	7%	
Verify the device	No	20	59%	3	38%	23	55%	0.220
	Not Pertinent	2	6%	2	25%	4	10%	
	Yes	12	35%	3	38%	15	36%	

to speech sounds [4-6]. However, the results of this research are similar to the previous study, which found that teachers do not have knowledge about the device used by their student and the communication strategies in the school environment. The authors emphasized that the understanding of these aspects is indispensable in enabling the learning of the hearing-impaired student and to ensure that this student is actually inserted in the school[12].

It is observed that teachers do not know the appropriate environment and distance to communicate with the student with hearing impairment and the need to verify the device used by that student.

The data corroborated with a study that aimed to characterize the knowledge of the teachers in relation to the hearing deficiency, conducting a speech therapy monitoring program and finding that all the participants, before the program, did not present sufficient knowledge to act with students with hearing impairment[12].

A similar study, conducted with 45 children's education teachers, in which 27% of the participants had already worked with hearing-impaired students, found that, of these, only 0.9% of the teachers demonstrated to have necessary knowledge about hearing impairment to act with these students[13].

It is prominent that the teacher plays a key role in the development of the hearing-impaired child using a HA or a CI, because the school is an environment in which the child remains for a significant time[12]. It is worth pointing out that the effectiveness of the use of these devices will only occur through actions in partnership with health care and education professionals, as well as the family[12-18].

Regarding education, the literature highlights the need for adaptations in the school environment, which include the preparation of the school's professionals, the adequacy of the classroom, the use of assisted technology and the Specialized Educational Service (SES), as a means of implementing the inclusion in current legislation[18,19].

The results of this study suggest the need for attention and qualification of health and education professionals, in order to make the speech therapy, social and academic adaptations possible for the hearing-impaired child, which are indispensable to compensate for the impact of hearing impairment on this individual's life [13,14].

CONCLUSION

The results showed that the teachers do not present knowledge on the degree of hearing loss of their student, on technological devices (HA, CI, FM System) and on communication strategies. There was a statistically significant difference in the relationship between knowledge of the degree of hearing loss of their student and the use of communication strategies to keep the attention of the hearing-impaired student in the classroom, showing that although the group of teachers have demonstrated no knowledge to the degree of hearing deficiency, they report changing the communication strategy to maintain attention, even though they were not aware of the appropriate communication strategies for their student with hearing impairment.

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Author contributions

FRS – Conceived the study design, data collection and preparation of the database, analysis of results and writing of the manuscript; EMCDP – Conceived the study design, data collection and preparation of the database, analysis of results and writing of the manuscript.