

Original articles

Facilitators and barriers for the use of the FM System in school-age children with hearing loss

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ABSTRACT

Objective: to analyze the facilitators and barriers to the use of the FM System in school-age children with hearing loss.

Methods: a cross-sectional, observational and documentary study. Data from the children's charts and responses of their 30 teachers to a questionnaire were used in the descriptive and inferential statistical analysis. The questions were related to the use of the FM System by the child and the preparation of the teachers to use the resource.

Results: out of the 30 children whose teachers answered the survey, only nine used the FM System in the classroom. Factors such as age, parents' schooling and their participation in speech therapy, as well as the teacher's knowledge about the FM System and their experience with hard of hearing children were shown to be facilitators for the use of the device as well as the consistent use of the hearing devices (hearing aids and/or cochlear implant).

Conclusion: the main facilitator for the use of the FM System was the teacher's knowledge about it. Considering the importance of the use of this resource for the mainstream education of children with hearing loss, a multi-centric research is desirable for the determination of protocols to follow the adaptation and training of the school community.

Keywords: Hearing Loss; Students; Mainstreaming (Education); Hearing Aids; Faculty

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INTRODUCTION

The acoustic school environment can be extremely hostile, especially for children with hearing loss, causing damage to their speech perception with consequences for the academic and psychosocial development of this group¹.

A few decades ago the Frequency Modulation System (FM System) has been used to improve the signal-to-noise ratio received by the hard of hearing child, being used especially in classrooms. It is considered, by several researchers, the most important and essential educational tool already developed¹⁻³.

In Brazil, in 2013, it was published the decree that introduced the FM System in the table of procedures, medicines, orthoses, prostheses and special materials (OPM) of the Unified Health System (SUS) - Decree No. 1.274 / GM / MS of the Ministry of Health in 2013, characterizing an important step in the schooling of children with hearing loss, with the expectation of improvements in the inclusion process for the hard of hearing children who use oral language, from five to seventeen to eleven months⁴.

After this period, some studies were carried out in view of the need to understand the process of adaptation of the FM System in the national reality⁵⁻⁷. These studies have highlighted to the use of the FM System as essential for the inclusion of hard of hearing children who use oral language, in the school environment and factors such as family participation and teacher engagement in this process are noted as important predictors for the good use of this resource^{1,2,5,6}.

At the same time, in the official documents referring to the accessibility of the hard of hearing children, the proposal for accessibility to content is the use of Brazilian Sign Language as a language of instruction, without specific references, to the variability of enrolled students^{8,9}.

Due to the advances in science, technology and public policies related to hearing care (PNASA, 2004),¹⁰ the detection and early intervention for babies and children with hearing loss is a reality in the national territory and, with the significant improvement in the coverage of neonatal screening (Law no. 12303/2010)¹¹ and with the implementation of the Specialized Centers in Rehabilitation (RECs, Law 7,612 / 2011)¹² - Unlimited Life Plan / Health of the Person with Disabilities) very soon, a number even more expressive of preschool and school children with hearing loss will attend regular schools in public and private educational settings¹³.

Thus, an expressive number of school-age children, users of hearing aids (HAs and / or Cochlear Implants - CIs) will be in classrooms throughout the country, using Portuguese as communication, since early and appropriate speech-language intervention makes possible the development of oral language^{13,14}.

Understanding that there is a great variability of educational needs for the hard of hearing population opens up many possibilities for the learner.

Thus, in addition to the important role of the sign language interpreter, for children with hearing loss using sign language; of the teacher of sign language, to those who are in sign language acquisition; the use of subtitled or signed materials; of the specialized teaching teacher qualified to deal with this range of particularities, there is also the need to think: "How to enhance the mainstream education of children with hearing loss who use or who are developing oral language?"

An important resource for access to oral language in the classroom is, therefore, the FM System¹⁵. There is already sufficient scientific evidence, including in the national scenario, to assert that this auxiliary resource is one of the pertinent tools for the successful inclusion of children with hearing loss^{1,2,5,6}.

However, adapting the FM system clinically is not a guarantee of effective use in the school environment¹⁶ and should be accompanied by systematic guidance to the school staff (mainstream classroom teacher, support teachers, specialized teaching teacher, since, like any new technological resource, it may raise doubts about its real benefit and also the fear of handling and care, resulting in the non-use or partial use of this tool in school.

There is a need to systematically monitor the use of this device in the classroom from the perspective of the teacher and from the student¹⁷.

Some of the factors that may influence the good adherence to the use of the FM System highlighted in the literature are:

- The teacher's knowledge of the device as well as its use in the classroom¹⁷.
- The cooperation between family and school must be considered of fundamental importance during the process of (re)habilitation, facilitating children's access to language learning procedures as well as their inclusion in school activities^{6,18}.
- The positive attitudes of the school towards the hard of hearing student, especially when the acceptance of the technology use and the perception of

the hearing devices importance that the children possess are understood by all who make the teaching process of this audience^{18,19}.

Thus, for regular schools to play the role of appropriate inclusion it is necessary to give children access to the perception of speech sounds and pedagogical content through curricular adaptations as well as structural adaptations and use of technology to improve their accessibility^{6,8,13,14,16}.

One of the factors that may contribute to the inclusion of these children in the classroom is the continuous training of teachers, highlighted in several studies^{20,21} as being of fundamental importance for the real inclusion of students with hearing loss.

The precariousness of professional training in the care of children with special educational needs is pointed out as an important barrier in the inclusion of these students, since educators tend to underestimate the competences of these students, making it difficult for them to access the academic contents²⁰.

As the use of the FM System becomes a decisive factor to facilitate the inclusion of the child in a school environment, the socio-demographic question must also be considered and, in this sense, it is essential that surveys are carried out throughout the country to evaluate the use of this hearing device in school-age children with hearing loss.

In this perspective, the objective of this study was to investigate the facilitators and barriers for the use of the FM System in students with hearing loss.

METHODS

This study is characterized as transversal, observational and documentary, approved by the Research Ethics Committee (59012-300) of the Federal University of Rio Grande do Norte, under the statement of number 1,144,295.

For the characterization of students with hearing loss, a survey of all the children attended in Program P1 (Aurioral Approach) of the SUVAG-RN Center was carried out, with 102 children being found.

From the analysis of all the medical records, observing the educational level of the children, it was verified that 85 were in school age.

Information concerning age, gender, etiology, type and degree of hearing loss, age at diagnosis, time of auditory sensory deprivation, thresholds in the field with the use of hearing devices, categories of hearing and language, time of adaptation with Cochlear Implant(s)

and /or Hearing Aids, level of education of the child and the caregiver, and family income were analyzed.

The data collection of the teachers was carried out at the moments of meetings of teachers of children with hearing loss, promoted by UFRN in partnership with the SUVAG Center to which these children are users. For the enrollment, an application form was sent to the families that should be taken to the school in order to be completed by the teacher.

Within the distributed forms (70), they returned 52 registration forms, attending only 28 teachers in the first meeting, of whom 16 accepted to participate in the study, signing the Informed Consent Term (ICT).

The second meeting was attended by 24 teachers, of whom 10 had already participated in the first meeting and 14 were new participating teachers. Of these 14 novice teachers, all accepted to participate in the research, totaling, finally, 30 teachers.

During meetings, the teachers were clarified about the objectives and method of this research and those who agreed to participate in the study signed the ICT. The research sample was therefore obtained for convenience.

A questionnaire was applied for the teachers composed of the general data (name, age, academic background, time of profession, type of specialization) and specific questions about their knowledge regarding the FM System, use, to a student with a disability, the professional preparation for attending these students and their attitudes towards teaching for the hard of hearing children.

To obtain the data in relation to the family characterization, the Family Involvement Scale²⁰ was collected secondary, through the database of the Center SUVAG-RN.

This scale aims to characterize the quality of participation and family engagement in the intervention process, taking as a parameter the analysis of the child therapist on a progressive scale of 1 to 5, where 1 is characterized as limited involvement and 5 as ideal involvement. For this evaluation, aspects such as family adaptation, participation in sessions, family attitudes and behaviors, and effectiveness of communication with the child were considered²¹.

The arithmetic mean between the notes given by the three therapists of each of the children (individual and group therapist) was used.

All information obtained was tabulated in Excel®

and analyzed using the statistical software IBM® SPSS® Statistics 2.0 using Wilcoxon's non-parametric test and Logistic Regression.

This method has the characteristic of comparing events in relation to a fixed variable, which in the case of the study was selected the "use of the FM System in the classroom".

Table 1 shows the demographic distribution of the students whose teachers took part in the research in relation to age, type of hearing device, duration of use of HAs and / or CI in years and months, the number of hours used hearing aids per day (*Data logging*), to schooling and using the FM System in the classroom (according to the teacher).

Table 1. Demographic distribution of the children who participated in the research

Child	Age (yr/m)	Kind of Device	Hearing Age	HA(s) use (mean between the ears)	Education	FM System use in classroom (According to the teacher)
1	12.9m	Bilateral HA	2yr9m	9.1	Elementary. II	No
2	13.1m	Unilateral HA (LE)	4yr3m	8.6	Elementary. II	No
3	9.7m	Bilateral HA	4yr1m	12	Elementary. I	Yes
4	11.7m	Unilateral HA (LE)	0y8m	2.1	Elementary. II	No
5	6.11m	CI and AASI	4yr10m	8	Elementary. I	No
6	13.7m	Bilateral HA	4yr0m	9	Elementary. II	No
7	8.0m	Bilateral HA	3yr0m	9	Elementary. I	Yes
8	10.3m	CI and AASI	7yr8m	10.1	Elementary. I	No
9	8.6m	Bilateral HA	2yr10m	6	Elementary. I	No
10	12.1m	Bilateral HA	6yr7m	10	Elementary. II	No
11	8.9m	Bilateral HA	1y1m	6	Elementary. I	No
12	12.4m	Unilateral HA (LE)	5yr8m	10	Elementary. II	Yes
13	10.9m	CI bilateral	8yr0m	12	Elementary I	Yes
14	9.2m	Bilateral HA	3yr2m	9	Elementary II	Yes
15	4.5m	Bilateral HA	1y10m	5	Preschool	Yes
16	6.4m	CI and HA	5yr4m	12	Elementary I	Yes
17	6.0m	Bilateral HA	1y4m	7	Preschool	No
18	11.4m	Bilateral HA	5yr0m	9.2	Elementary II	No
19	3.0m	Bilateral HA	1y0m	6	Preschool	No
20	9.11m	Bilateral HA	9yr4m	5	Elementary. I	Yes
21	6.6m	CI and HA	4yr3m	10	Elementary. I	No
22	12.3m	Bilateral HA	4yr4m	3	Elementary II	No
23	10.3m	CI and HA	5yr5m	12	Elementary I	No
24	8.6m	CI bilateral	8yr2m	13	Elementary I	No
25	14.2m	Bilateral HA	4yr4m	10	Elementary II	Yes
26	11.9m	Bilateral HA	2yr11m	11	Elementary. II	Yes
27	6.7m	Bilateral HA	0y0m	0	Elementary. I	No
28	12.8m	Bilateral HA	7yr8m	12	Elementary. II	No
29	12.7m	Bilateral HA	10yr6m	14.3	Elementary. II	No
30	10.5m	Bilateral HA	8yr1m	10.2	Elementary. I	No

Legend: Age (y / m) - age in years and months; FM system - frequency modulation system; HA-Hearing Aids; CI - cochlear implant; LE- left ear; E -Elementary; P - Preschool.

In Table 2 it is observed the demographic distribution of the teachers participating in the research

in relation to their age, academic background, post-graduation and knowledge of the FM System.

Table 2. Demographic distribution of the teachers who participated in the research

Teacher	Age (y)	Academic Degree	Post-graduation (specialization)	Knows the FM System
1	28	Pedagogy	Psycho-pedagogy	Yes
2	32	Pedagogy	Management	No
3	45	Pedagogy	Special-education	Yes
4	34	Language - Portuguese	Linguistics	No
5	29	Pedagogy	Does not have	No
6	38	Pedagogy	Special-education	Yes
7	28	Pedagogy	Special-education	No
8	57	Pedagogy	Does not have	No
9	35	Pedagogy	Special-education	Yes
10	35	Language - Portuguese	Does not have	No
11	28	Pedagogy	Management	Yes
12	38	Biology	Environmental-education	Yes
13	29	Pedagogy	Psycho-pedagogy	Yes
14	28	Pedagogy	Psycho-pedagogy	Yes
15	36	Pedagogy	Psycho-pedagogy	No
16	38	Pedagogy	Special-education	Yes
17	31	Pedagogy	Special-education	No
18	28	Geography	Does not have	No
19	27	Pedagogy	Educação e Transdisciplinaridade	No
20	37	Pedagogy	Children's Education	Yes
21	44	Pedagogy	Does not have	No
22	46	Language - Portuguese	Special-education	Yes
23	32	Pedagogy	Children's Education	Yes
24	33	Pedagogy	Sign Language	Yes
25	28	Mathematics	Portuguese and Mathematics teaching	Yes
26	36	Language - Portuguese	Does not have	Yes
27	36	Pedagogy	Children's Education	No
28	43	Language - Portuguese	Does not have	Yes
29	34	History	Sociology	No
30	29	Pedagogy	Psycho-pedagogy	Yes

Legend: Age (y) - Age in years; FM system - frequency modulated system.

RESULTS

The results were organized in order to analyze the information collected in the records (data logging, hearing and language categories of the children, age and income of the person responsible and family engagement) and the questionnaire applied to teachers (age, academic background, specialization, experience with hard of hearing children and knowledge regarding

the FM System) and the possible associations between these variables with the use (or not) of the FM System in the classroom.

In addition, the analysis of teachers' comments concerning their preparation to act in the inclusion of hard of hearing children who use oral language was also performed, presented in Figures 1 and 2, below.

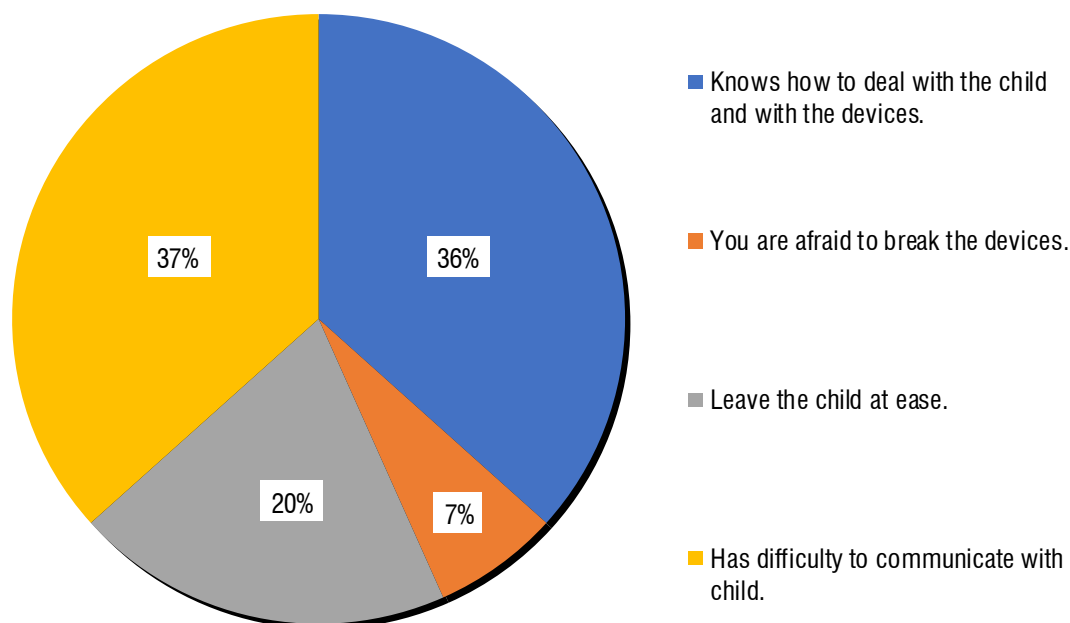


Figure 1. Answers from the teachers' questionnaire to the question: "How do you feel about the hearing impaired student?"

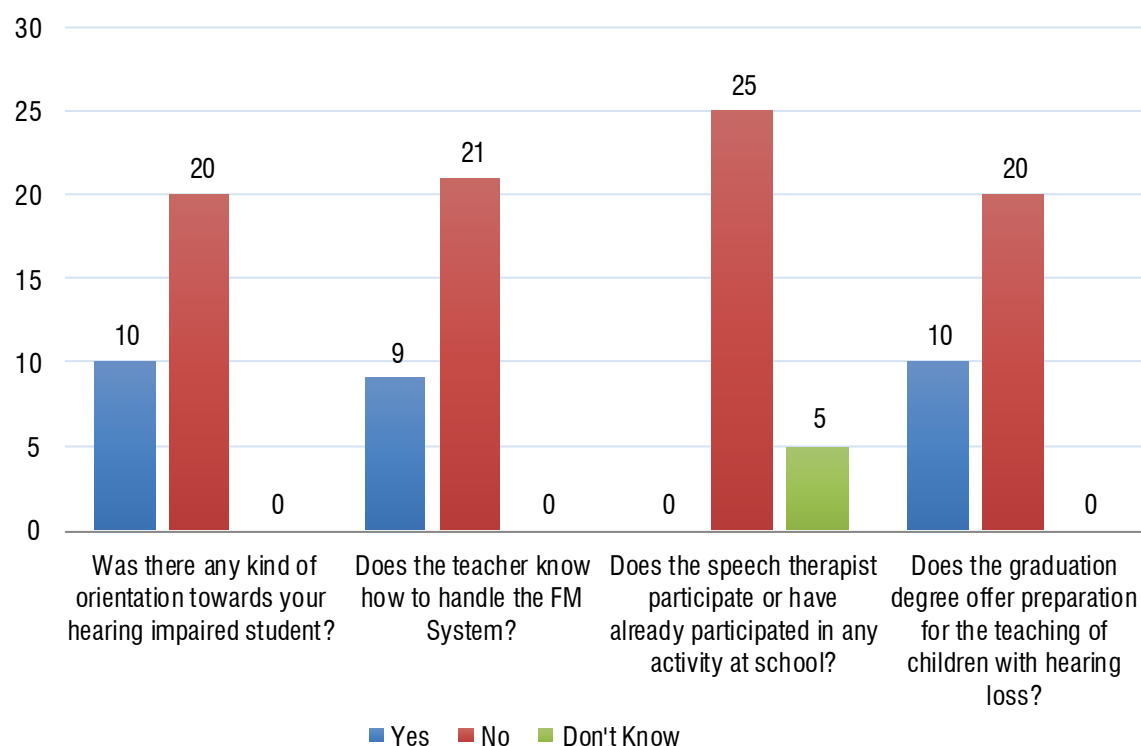


Figure 2. Answers from the questionnaire to the questions related to the training and support offered to the teacher

In Table 3 it is showed the values obtained through the Wilcoxon test for two samples in order to test if the distributions of one variable tend to have values greater than the other, with the respective p.

The values of p show the statistical relevance of each variable related to the use of the FM System in the classroom.

Values of $p < 0.05$ were considered statistically significant.

Table 3. Distribution of the descriptive frequencies and inferential analysis of the variables associated with the use of the Frequency Modulation System in the classroom

	Does the student use the FM system in class?						p-value
	Yes		No		Total		
	N	%	N	%	N	%	
HA use (<i>Data logging</i>)	9	1	20	1	29**	1	0.22
Very insuficiente	1	11.1%	3	15.0%	4	13.8%	
Insuficiente	0	0.0%	5	25.0%	5	17.2%	
Enough	8	88.9%	12	60.0%	20	69.0%	
Hearing Category	9	1	21	1	30	1	0.86
1	0	0.0%	1	5.0%	1	3.4%	
2	0	0.0%	1	5.0%	1	3.4%	
3	1	11.1%	1	5.0%	2	6.9%	
4	1	11.1%	2	10.0%	3	10.3%	
5	2	22.2%	7	35.0%	9	31.0%	
6	5	55.6%	9	40.0%	14	44.8%	
Language Category	9	1	21	1	30	1	0.82
1	0	0.0%	1	5.0%	1	3.4%	
2	1	11.1%	2	10.0%	3	10.3%	
3	1	11.1%	3	15.0%	4	13.8%	
4	2	22.2%	7	35.0%	9	31.0%	
5	5	55.6%	8	35.0%	13	41.4%	
Age of the responsible	9	1	21	1	30	1	0.40
From 20 to 40 years old - Young adult	6	66.7%	17	81.0%	23	76.7%	
From 40 to 60 years old - Middle age	3	33.3%	4	19.0%	7	23.3%	
Education level of the responsible	9	1	21	1	30	1	0.26
Elementary School finished	2	22.2%	3	14.3%	5	16.7%	
High School finished	5	55.6%	17	81.0%	22	73.3%	
Graduation Finished	2	22.2%	1	4.8%	3	10.0%	
Income of the responsible	9	1	21	1	30	1	0.20
Low	5	55.6%	18	85.7%	23	76.7%	
Average	3	33.3%	2	9.5%	5	16.7%	
High	1	11.1%	1	4.8%	2	6.7%	
Average Family Involvement Scale	9	1	21	1	30	1	0.66
Bad participation	1	11.1%	4	19.0%	5	16.7%	
Intermediate participation	5	55.6%	13	61.9%	18	60.0%	
Good participation	3	33.3%	4	19.0%	7	23.3%	
Teacher's Formation	9	1	21	1	30	1	0.33
Pedagogy	6	66.7%	15	71.4%	21	70.0%	
Language-portuguese	1	11.1%	4	19.0%	5	16.7%	
Biology	1	11.1%	0	0.0%	1	3.3%	
Mathematics	1	11.1%	0	0.0%	1	3.3%	
Geography	0	0.0%	1	4.8%	1	3.3%	
History	0	0.0%	1	4.8%	1	3.3%	
Specialization	9	1	21	1	30	1	0.55
Psycho-pedagogy	2	22.2%	3	14.3%	5	16.7%	
School Management	0	0.0%	2	9.5%	2	6.7%	
Special Education	3	33.3%	4	19.0%	7	23.3%	
Environmental Education	1	11.1%	0	0.0%	1	3.3%	
Linguistics	0	0.0%	1	4.8%	1	3.3%	
Education and Transdisciplinarity	0	0.0%	1	4.8%	1	3.3%	
Children Education	1	11.1%	2	9.5%	3	10.0%	

Does the student use the FM system in class?							p-value
	Yes		No		Total		
	N	%	N	%	N	%	
Sign language	0	0.0%	1	4.8%	1	3.3%	0.59
Portuguese and Mathematics teaching	1	11.1%	0	0.0%	1	3.3%	
Sociology	0	0.0%	1	4.8%	1	3.3%	
Does not have	1	11.1%	6	28.6%	7	23.3%	
Teacher's age	9	1	21	1	30	1	0.59
Young adult	8	88.9%	17	81.0%	25	83.3%	
Middle age	1	11.1%	4	19.0%	5	16.7%	
Has already worked with children with hearing loss	9	1	21	1	30	1	0.13
Yes	7	77.8%	10	47.6%	17	56.7%	
No	2	22.2%	11	52.4%	13	43.3%	
Has special education training	9	1	21	1	30	1	0.52
Yes	5	55.6%	9	42.9%	14	46.7%	
No	4	44.4%	12	57.1%	16	53.3%	
Knows the FM system	9	1	21	1	30	1	0.003*
Yes	9	100.0%	9	42.9%	18	60.0%	
No	0	0.0%	12	57.1%	12	40.0%	

* p-value with statistical significance <0.05 in the Wilcoxon test.

** The value indicates that there is a child waiting for the Hearing Aids / FM System. For this reason it still does not fit the data logging check.

Legend: Hearing Aids - sound amplification apparatus; FM system - frequency modulated system; Letters-Port. - Letters - English.

In Table 4 it is presented the Logistic Regression of the following variables: family-related - age, schooling and family participation; related to the teacher - experience with children with hearing loss and continuing education in the area of special education.

This analysis was used with all the variables studied, however, only those that presented a chance value to "explain" the use of the FM System in the classroom were selected for discussion.

Table 4. Odds ratio among the variables that influence the use of the Frequency Modulation System in students with hearing loss

Variables inserted in Regression model	OR	CI		p-value RL
		Inf	Sup	
Age of the responsible				
Young adult	3.28	0.35	30.81	0.29
Middle age	-	-	-	-
Education level of the responsible				
Elementary	-	-	-	-
High School	1.68	0.16	18.21	0.66
College	0	0	0	-
Family Involvement				
Bad	-	-	-	-
Average	5.04	0.21	118.47	0.32
Good	6.65	0.21	206.78	0.28
Previous experience with children with hearing loss				
No	-	-	-	-
Yes	7.000	0.553	88.538	0.133
Teacher training in Special Education				
No	-	-	-	-
Yes	0.40	0.03	4.71	0.47

Statistical Testing: Logistic Regression

Legends: OR – Odds Ratio); CI – Confidence Interval. LR – Logistic Regression

DISCUSSION

Multiple studies have already proven the effectiveness of the Frequency Modulation system as an accessibility resource for students with hearing loss^{1,3,5,17}.

In this research, the results revealed that of the 30 participating teachers only nine stated that their students use FM in the classroom. This finding does not corroborate the research on the benefits and the use of the FM System by children with hearing loss, evidencing a mismatch between the clinical-scientific recommendations and the school reality of these hard of hearing children who use oral language.

Some factors can be listed for the use of FM in the classroom, such as: history of previous use for Hearing Aids or Cochlear Implant, own development of hearing and language of the child, understanding, by the family, the real importance of the child to use the hearing device, as well as their involvement in (re) habilitation of their child, the insertion of the speech-language pathologist in the school context, technical issues such as possible breaks and defects in devices FM, the fear of families about the loss and / or breaking of the FM in the classroom, how confident the child is to use a new resource in the school, the information given to the teacher about this accessibility resource both in

the context of the documents and ongoing training on how to use the equipment².

In the analysis proposed in this research some of the above factors were observed and will be discussed below.

Among the children whose teachers reported FM users, it was noted that 88.9% (n = 8) had the data logging measure classified as sufficient use of HAs (an average of 14.3 hours per day), which was possibly a facilitating factor for the adherence to the FM System in the classroom¹⁹. Gustafson et al.²¹ pointed out that individuals who use hearing aids can better perform tasks related to social everyday life, including school and family tasks.

Regarding the Audition and Language categories, 55.6% (n = 5) of the children whose teachers said they use FM in the classroom are in the highest categories.

This factor can also be related to the effective use of hearing devices, and the FM System is still a tool in the access to oral language in the classroom. The positive cascade effect of the device effective use is cited in the literature as a facilitator for the inclusion of hard of hearing children who use oral language^{2,3,5,7,15,22,23}.

Concerning the family participation in the (re)habilitation process of the hard of hearing children, the data show that 33.3% (n = 3) of the children using the FM

System (n = 9) had a good average of participation in therapy and 55.6% (n = 5) an intermediate participation. Only 11.1% (n = 1) of the families of children using FM System in the classroom were identified as having a poor participation in the (re)habilitation program.

However, a 61.9% (n = 13) share of families whose children were identified as non-users of the FM System at school were also considered as intermediate participants and 19% (n = 4) as good participants in the (re)habilitation²² program of their children.

Family involvement in (re)habilitation is evaluated by the speech therapist and other therapists of the child, being highlighted in the literature as a robust factor for the adequate development of children with hearing loss^{3,6,14,20}.

Thus, it is questioned whether speech therapists and other therapists are aware of the use of the FM system by the children they attend and consider this question also as “family participation” in the (re)habilitation process, since, for it is a resource for personal use, the family should be the agent responsible for presenting the FM system initially to the school and will play the role of supporting the child’s use of it in other settings as well.

In addition, it can be questioned why families considered as having intermediate participation (61.9%) and good participation (19%) of the cases, do not send their children’s FM systems to school and apparently do not make the bridge between this accessibility resource and the school, as expected for families who understand the needs of their children.

An important fact to be observed in this study is the participation of the speech therapist in the school context. According to the teachers’ responses, shown in Figure 2, speech therapist are still far from the educational reality of these hard of hearing children, and no teacher mentioned the presence of the professional responsible for the therapeutic management of the child at school. It should be emphasized that the audiologist and / or the speech therapist is a decisive factor for a good participation of the family in the therapeutic process of children with hearing loss and this orientation should include the school environment¹⁴.

Considering that the better the communication / orientation between the therapist and the family, the better the dissemination of information between family and school, the audiologist and / or speech therapist becomes a key factor for the inclusion of hard of hearing students, having the function of mediating

doubts, anxieties and advances that arise both within the family and in the school environment¹⁴.

It is observed that 77.8% (n = 7) of the teachers who answered yes to the use of the system by the student with hearing loss had previous experience with these students.

This fact may be related to the continued education of teachers. Studies show that the teacher who has a challenging situation in the classroom seeks more information about the “problem” situation than those who work with situations typical of the school context^{18,24}.

The total number of teachers who answered that students use the FM system already knew the equipment, given statistically significant. On the other hand, for teachers who answered that the students did not use the system, their knowledge about the system was 42.9% (n = 9) for yes (knows the system) and 57.1% (n = 12) knows the system).

This information implies that the information that the teacher has about his or her hard of hearing student is at the same time a facilitating factor in the case of well-trained teachers and a barrier if they have little or no knowledge of their specific needs, with few contributions to the successful inclusion of this student.

Regarding the variables that are associated with the use of the FM System in the classroom, evidenced through the logistic regression, although it was noticed that not all families considered good the use of the FM system in the school, it was observed that children who have parents with family engagement considered to be “good” have 6.65 times more chances of using the FM System, corroborating with studies related to family participation in the (re)habilitation process of the hearing impaired child^{6,14,21}.

In addition, children whose parents are considered to be “young adults” are 1.68 times more likely to use the FM System in the classroom.

Regarding teachers, the regression model showed that children whose teachers have experiences with students with hearing impairment are seven times more likely to use the FM system in the classroom, since it is quite relevant, which is a potentially favorable factor for the inclusion of children with hearing loss²⁰.

It is important to note that due to reduced n, most of the variables did not have a statistically significant p-value.

In future studies, we intend to increase the sample by analyzing these and other potentially facilitating factors or barriers to the use of the FM system in the classroom, also analyzing the influence of the

Frequency Modulation System on the academic performance of the hard of hearing student.

CONCLUSION

The factors identified as potential facilitators or barriers to the use of the FM System were the teachers' knowledge about the FM System and their experience with children with hearing loss, the use of hearing devices by the children and family engagement in the process of (re)habilitation, besides the age and schooling of those responsible for them.

Thus, family participation and continuing teacher training are important factors for the FM System application in the classroom.

The limitations of this research refer to the sampling and analysis of the local reality, besides the impossibility of measures of academic performance and satisfaction with the FM System with the students and information collection with the families. In the continuity of this study, the children and the relatives shall be evaluated and the totality of investigations with the teachers will be searched.

It is understood that the progression of the search for scientific evidence on the effective use of the FM System is extremely important, in order to make the right to accessibility a reality for students with hearing loss.

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