REVISTA CEFAC
SPEECH, LANGUAGE, HEARING SCIENCES AND EDUCATION JOURNAL
Rev. CEFAC. 2022;24(4):e3322 https://doi.org/10.1590/1982-0216/20222443322

Original articles

Use of hearing devices and fluency in Brazilian Sign Language and oral language fluency in deaf students

Erika Fernanda Clark[1]
https://orcid.org/0000-0003-3503-246X

Ludimila Labanca[1,2]
https://orcid.org/0000-0003-3296-4800

Izabel Cristina Campolina Miranda[2]
https://orcid.org/0000-0002-9455-5562

Denise Utsch Gonçalves[1,3]
https://orcid.org/0000-0002-9154-7436

[1] Universidade Federal de Minas Gerais – UFMG, Faculdade de Medicina, Programa de Pós-graduação em Ciências Fonoaudiológicas, Belo Horizonte, Minas Gerais, Brasil.

[2] Universidade Federal de Minas Gerais – UFMG, Faculdade de Medicina, Departamento de Fonoaudiologia, Belo Horizonte, Minas Gerais, Brasil.

[3] Universidade Federal de Minas Gerais – UFMG, Faculdade de Medicina, Departamento de Otorrinolaringologia, Belo Horizonte, Minas Gerais, Brasil.

Study conducted at the Department of Speech-Language-Hearing Sciences of the Medical School at the Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil.

Conflict of interests: Nonexistent

Received on: June 13, 2022
Accepted on: October 11, 2022

Corresponding address:
Ludimila Labanca
Avenida Professior Alfredo Balena, 190
CEP: 30130-100 - Belo Horizonte, Minas Gerais, Brasil
E-mail: ludlabanca@gmail.com; ludlabanca@ufmg.br

ABSTRACT

Purpose: to assess the relationship between deaf students' fluency in Brazilian Sign Language (BSL) and oral language and hearing aid use.

Method: the sample comprised 112 professional BSL translators, interpreters, and instructors. They answered a questionnaire on hearing characteristics and BSL and oral language fluency of students accompanied by them, who attended municipal schools in a Brazilian city. Association analysis between oral language fluency, BSL fluency, the degree of hearing loss, and device use was made with the chi-square test or Fisher's Exact test. The significance level was set at $p<0.05$.

Results: the professionals' responses referred to 88% ($n = 126$) of all deaf students enrolled in municipal schools. The students' mean age was 13 years; 72 (57%) were males, 98 (78%) had severe or profound hearing loss, 57 (45%) used electronic hearing devices, 83 (66%) were fluent only in BSL, 12 (10%) were fluent only in oral language, and 18 (14%) were fluent in both BSL and oral language. Hearing device use was statistically associated with oral fluency ($p < 0.001$). Of all students fluent in oral language ($n = 30$), 18 (60%) were also fluent in BSL ($p < 0.001$).

Conclusion: BSL was the communication modality most used by students, including those who also used oral language and electronic hearing devices. This may indicate a change in the social perception of deaf people, their language, and their culture.

Keywords: Hearing Loss; Language; Multilingualism; Hearing; Hearing Aids

INTRODUCTION

There are an estimated 9.7 million Brazilians with hearing loss, of whom 2.6 are self-declared deaf, while the other 7.2 millions have some type of hearing difficulties (*Instituto Brasileiro de Geografia e Estatística*, 2010). Hence, about 5% of the Brazilian population has hearing loss[1]. In Minas Gerais, state schools have 1,530 students with some hearing loss[2]. In its capital, Belo Horizonte, there are currently about 144 students with hearing loss in municipal schools, attending 78 inclusive schools in the municipality[3].

There is an ongoing significant change process in the social perception of deaf people and their language and culture. Nevertheless, this process is slow when it comes to educational policies. Brazilian Sign Language (BSL), for instance, was only recognized as a language and received such status about 20 years ago. Associations of deaf people fight to ensure their rights, but these movements have not been strong enough yet to achieve satisfactory changes. Hence, deaf Brazilians continuously work on making BSL known as a recognized language, aiming to ensure their lawful rights[4].

From the socio-anthropological perspective, deafness is a visual experience that restructures preconceived normality[5,6]. This visual experience is not specifically restricted to linguistic issues or a unique cognitive processing modality, but rather to all types of deaf people's intellectual, linguistic, ethical, aesthetic, artistic, cognitive, cultural, and other productions[5]. Changing perspectives to neutralize the pathological view of deafness (which the fields of health still often addressed as such) and give priority to language development with BSL, there is a sociocultural approach to deaf children. It views BSL teaching as essential to consolidate bilingual public policies from deaf people's cultural standpoint[7].

Adequate linguistic development knowingly needs feedback from language users – i.e., language accessibility is a principle of language acquisition[7]. The language used by hearing speakers is oral/auditory and requires auditory integration to be naturally acquired. Hence, hearing children are naturally and constantly exposed to oral language from birth, enabling them to have communicative exchanges and experiences in the environment, which leads to their language and cognitive development. BSL, however, is a visual/gestural language, which does not depend on hearing to be acquired. It is more naturally acquired by deaf people, as information can be understood and expressed with no communication barriers[7,8].

BSL use at school is an important means of teaching. The National Policy for Special Education in the perspective of inclusive education, based on the Brazilian Law for the Inclusion of People with Disabilities (Law 13,146/15), addresses bilingual education as a setting for the inclusion of such children[9].

The notion that using hearing devices is incompatible with BSL has been losing strength, and bilingual education for deaf people has potentialized learning relationships for deaf children[7]. Bilingual education is school teaching in both Portuguese and BSL, in which written Portuguese is addressed as deaf children's second language. Also, bilingual education must ensure that BSL is taught to hearing schoolchildren and that a professional BSL translator/interpreter or instructor is present in the classroom to give support to deaf children. This perspective also provides Specialized Educational Attention, with the support of specialized BSL teachers[9].

BSL translators/interpreters play an essential role in the effective interaction between deaf and hearing children, facilitating the linguistic exchange in the learning process, access to culture, identity, and broad acquisition of study content. BSL instructors, sharing objectives in common with translators/interpreters, play the role of naturally teaching it to deaf students for them to use it as a means of school learning[10].

This research aimed at describing the relationship between fluency in BSL, fluency in the oral language, and hearing devices in deaf students.

METHODS

This is a cross-sectional observational study. The research complied with the determinations of the National Health Council in Resolution no. 510, of April 7, 2016, and was approved by the Research Ethics Committees of the participating institutions Municipal Department of Education of Belo Horizonte and Federal University of Minas Gerais, Brazil, under no. 57818916.7.0000.5149. All participants were informed of the research objectives and procedures and agreed with the informed consent form.

The first stage of the study was the contact with the Municipal Department of Education of Belo Horizonte (SMED), which indicates that the Department for Inclusive Education and Ethnic/Racial Diversity (DEID) is responsible for ensuring access to BSL, disseminating it among deaf and hearing students, and promoting and coordinating inclusive educational policies for people with disabilities[11]. SMED furnished

sociodemographic data and hearing characteristics (the type, side, and degree of hearing loss) of all deaf children attending municipal schools in Belo Horizonte, with and without accompanying professional BSL translators/interpreters or instructors.

The municipal education system of Belo Horizonte encompasses pre, elementary and middle school, and adult education. There are currently 144 deaf students attending 78 municipal schools in Belo Horizonte, of whom 126 (87%) receive support from professional translators/interpreters and instructors in school learning (Figure 1).

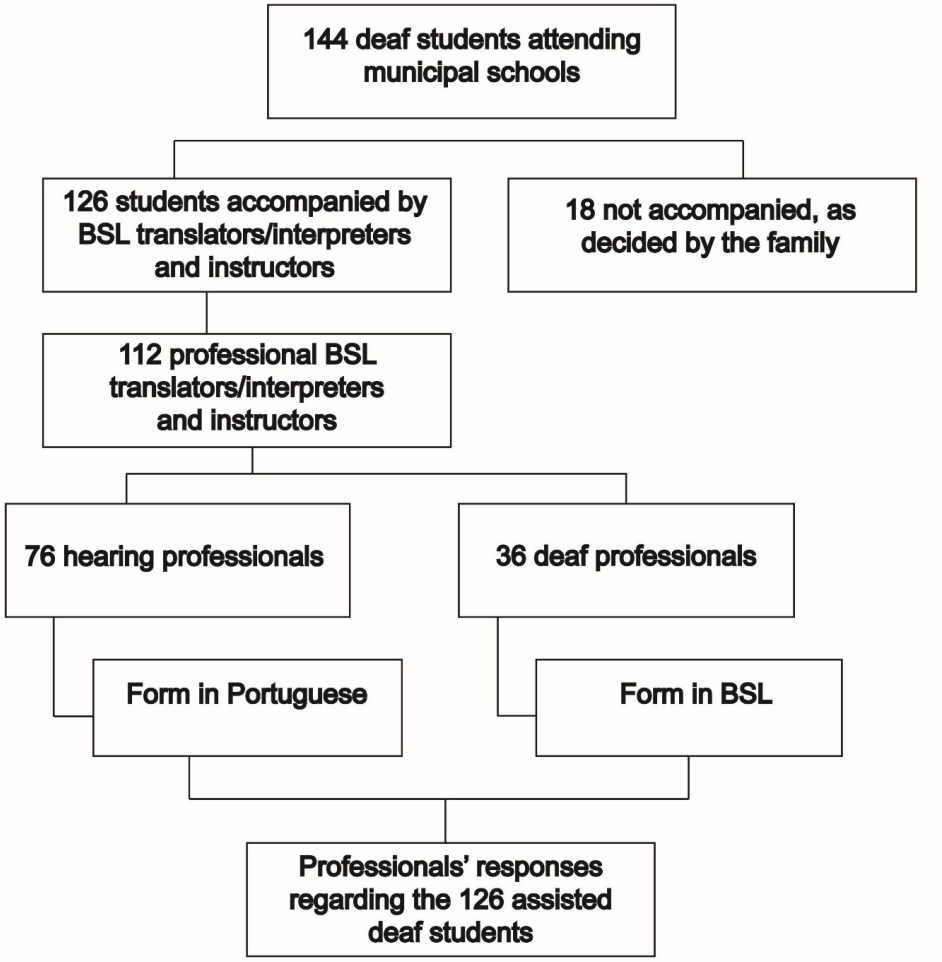

Figure 1. Distribution of 144 students accompanied by 112 professional Brazilian Sign Language (BSL) translators/interpreters and instructors interviewed through forms in either BSL or Portuguese

The second stage of the study consisted of contacting the Association of Deaf People of Minas Gerais. This is a nongovernmental organization partnered with the municipal government of Belo Horizonte, providing third-party professional BSL translators/interpreters and instructors who work in the municipal school system of Belo Horizonte. The Association of Deaf People of Minas Gerais furnished information on all BSL interpreters, translators, and instructors who accompanied deaf students attending municipal schools in Belo Horizonte. Altogether, they were 112 professionals working in these schools, giving support during classes and Specialized Educational Attention classrooms.

The third stage of the study aimed at contacting the BSL interpreters, translators, and instructors, inviting them to participate in the research and instructing them on how to fill out the structured questionnaire developed in Google Forms – which addressed their perception of the deaf students they assisted. The questionnaire had an informed consent form, and participants could only continue reading the questionnaire after reading and

agreeing with it. The questionnaire collected data on the following topics: the school where BSL translators/interpreters and instructors worked; the age of the students they accompanied; whether students used any hearing devices (hearing aids, cochlear implants); how students preferably communicated (BSL, speech, gestures); how was the students' fluency in BSL and oral language. The students' fluency was classified by the professionals based on their everyday analysis of students' communicative situations. Students were considered fluent when they could produce and comprehend a language, spontaneously communicating with a natural flow in the BSL interpreter's, translator's, or instructor's perspective. Thus, professionals considered fluent in BSL students who communicated with no difficulties, and non-fluent those who had difficulties understanding basic signs and contexts or who did not know BSL. As for oral language, students who communicated with no difficulties were considered fluent, whereas those who had much difficulty producing and understanding oral communication or did not communicate using oral language were considered non-fluent.

Professionals who accompanied more than one student filled out one questionnaire per student.

The study included data on all 126 students accompanied by professional BSL translators/interpreters and instructors, with mild, moderate, severe, or profound hearing loss (Figure 1).

The fourth stage of the study consisted of data analysis, addressing the following variables: students' sociodemographic characteristics, hearing characteristics, electronic device use, and fluency in BSL and oral language. In statistical analysis, the degrees of hearing loss were grouped into "mild/moderate" and "severe/profound". In the case of asymmetrical hearing loss, the degree in the best ear was considered, as it is expected to provide better hearing performance and influence the decision for communicative modalities. The data bank was structured in Excel, and the statistical analyses were made in SPSS (Statistical Package for the Social Sciences), version 15.0. Descriptive statistics including indices of the measures of central tendency (mean), dispersion (standard deviation), and frequency were used to characterize students regarding the study variables. The chi-square test or Fisher's Exact test was used for the comparative analysis between electronic device use, fluency in BSL, fluency in the oral language, and the degree of hearing loss. The McNemar test was used to analyze the association between fluency in BSL and in oral language.

RESULTS

Study population

There are 144 (100%) reported hearing-impaired children registered at SMED-BH and enrolled in the municipal school system. Figure 2 shows the map with their demographic distribution in the municipality of Belo Horizonte in 2019.

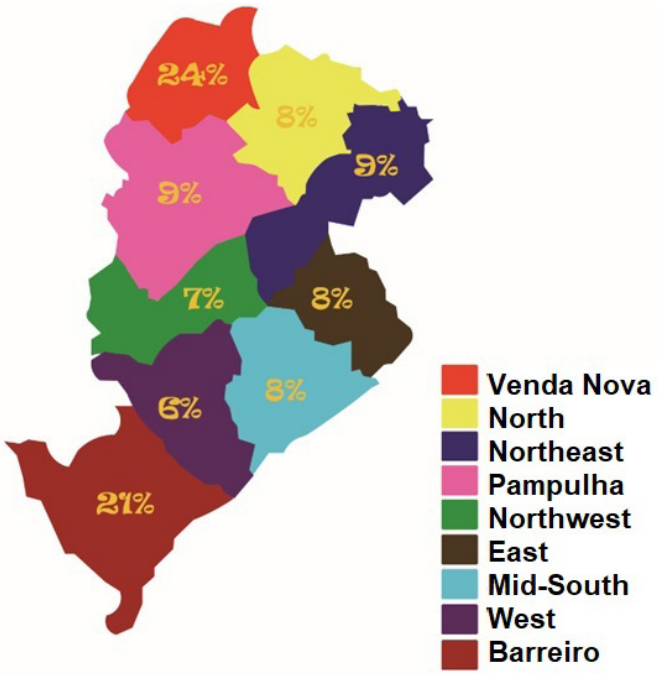

Figure 2. Percentage of the demographic distribution of deaf students attending municipal schools in the municipality of Belo Horizonte, 2019 (n = 144)

Belo Horizonte is divided into nine regions: Barreiro, Mid-South, East, Northeast, Norwest, North, West, Pampulha, and Venda Nova. The highest relative percentage of deaf students was in Barreiro and Venda Nova (45%). Of the 144 assessed students, 126 (87%) were accompanied by professional BSL translators/interpreters and instructors. SMED-BH informed that the family of 18 (13%) students classified as deaf decided they would not be accompanied by professional BSL translators/interpreters or instructors. The students' demographic data and characteristics included in this study referred to those who were accompanied by professional BSL translators/interpreters and instructors (n = 126). The students' mean age was 13 years (standard deviation = 10; median = 12; minimum = 3; maximum = 65); most of them (92%) were under 20 years old. Out of the students who were accompanied by such professionals, 72 (57%) were males and 54 (43%) were females. As for the grade in school, 74 (60%) were attending elementary/middle school, 36 (32%) were in preschool, and 16 (8%) were in adult education.

Hearing characteristics and fluency in oral language and BSL

All students included in this study had bilateral hearing loss. Aspects related to hearing loss, electronic device use, communicative modality, and fluency in BSL and oral language of deaf students attending municipal schools are shown in Table 1.

Table 2 shows the results of fluency in the oral language in relation to hearing characteristics.

Table 1. Descriptive analysis of audiological and communication characteristics of deaf students enrolled in the municipal school system of Belo Horizonte. N = 126

Variable		Frequency (%)
Degree of hearing loss*	Mild	7 (5)
	Moderate	21 (17)
	Severe	39 (31)
	Profound	59 (47)
Electronic Devices	Use	57 (45)
	No use	69 (55)
Which electronic devices (N = 57)	Bilateral HA	31 (24)
	Unilateral HA	8 (6)
	Bilateral CI	3 (2)
	Unilateral CI	15 (13)
Communicative modality used	Oral language	12 (10)
	BSL	68 (54)
	Oral language and BSL	38 (30)
	None	8 (6)
Fluency in BSL and/or oral language	Only oral language	12 (10)
	Only BSL	83 (66)
	BSL and oral language	18 (14)
	No fluency	13 (10)
Fluency in BSL	Non-fluent	25 (20)
	Fluent	101 (80)
Fluency in oral language	Non-fluent	97 (77)
	Fluent	29 (23)

*The degree of asymmetrical hearing loss was classified based on the result of the best ear.
HA: hearing aid
CI: cochlear implant
BSL: Brazilian Sign Language

Table 2. Relationship between oral language fluency and hearing characteristics

Variable		Oral Fluency (%)		Total (%)	p-value	Odds ratio	Confidence Interval
		Yes	No				
Degree of hearing loss (n=126)	Mild or moderate	7 (24)	21 (22)	28 (23)	0.488*	1.152	0.433-3.062
	Severe or profound	22 (76)	76 (78)	98 (77)			
	Total	29 (100)	97 (100)	126 (100)			
Device use (n=126)	Yes	22 (76)	35 (36)	57 (45)	<0.001*	5.48	2.177-15.09
	No	7 (24)	62 (64)	69 (55)			
	Total	29 (100)	97 (100)	126 (100)			
Type of device (n=57)	HA	17 (77)	22 (63)	39 (68)	0.563**	1.316	0.513-3.370
	CI	5 (23)	13 (37)	18 (32)			
	Total	22 (100)	35 (100)	57 (100)			

p = probability of significance, chi-square test or Fisher's Exact test**;
HA: hearing aid
CI: cochlear implant

Results indicate no statistically relevant difference between the degree of hearing loss and fluency in oral language (p=0.488). The association analysis between oral fluency and electronic devices indicated that students who used electronic devices were more likely to be fluent in oral language than those who did not use them (p<0.001). The type of electronic device used (hearing aid or cochlear implant) did not interfere with oral language fluency (p=0.563).

Table 3 presents the results of fluency in BSL in relation to hearing characteristics.

Table 3. Relationship between fluency in the Brazilian Sign Language and hearing characteristics. N = 126

Variable		Fluency in BSL (%)		Total (%)	p-value*	Odds ratio	Confidence Interval
		Yes	No				
Degree of deafness (n=126)	Mild or moderate	22 (22)	6 (24)	29 (23)	0.877	1.085	0.388-3.034
	Severe or profound	79 (78)	19 (76)	98 (77)			
	Total	101 (100)	25 (100)	126 (100)			
Device use (n=126)	Yes	41 (40)	16 (64)	57 (45)	0.032	0.378	0.153-0.937
	No	60 (60)	9 (36)	69 (55)			
	Total	101 (100)	25 (100)	126 (100)			
Type of device (n=57)	HA	29 (66)	10 (63)	39 (68)	0.811	1.157	0.348-3.843
	CI	12 (34)	6 (37)	18 (32)			
	Total	41 (100)	16 (100)	57 (100)			

*p = probability of significance, chi-square test
HA: hearing aid
CI: cochlear implant
BSL: Brazilian Sign Language

Of the 126 students included in the study, 101 (80%) were fluent in BSL. There was no statistical difference between the degree of hearing loss and fluency in BSL (p=0.488). The association analysis between fluency in BSL and electronic devices indicated that students who did not use electronic devices were more likely to be fluent in BSL than those who used them (p=0.032).

Table 4 presents the influence of electronic device use on oral vs. BSL communication development.

Table 4. Association between device use, fluency in oral language and Brazilian Sign Language, fluency in only Brazilian Sign Language, and fluency in only oral language

Fluency	Device use (%)		Total (%)	p-value	Odds ratio	Confidence Interval
	Yes	No				
Oral language and BSL	15 (83)	3 (17)	18 (100)			
BSL	26 (32)	57 (68)	83 (100)	<0.001	10.69	(3.041-49.71)
Total	41 (40)	60 (60)	101(100)			
Oral language and BSL	15 (83)	3 (17)	18 (100)	0.129	0.28	(0.051-1.516)
Oral	7 (58)	5 (42)	12 (100)			
Total	22 (73)	8 (27)	30 (100)			
Oral	7 (58)	5 (42)	12 (100)			
BSL	26 (31)	57 (69)	83 (100)	0.066	0.33	(0.088-1.165)
Total	33 (34)	62 (66)	95 (100)			

*p = probability of significance, Fisher's Exact test
BSL: Brazilian Sign Language

Results indicate a significantly higher frequency of individuals fluent in both oral language and BSL among electronic device users than nonusers (p<0.001).

The comparison between fluency in only one modality (either oral language or BSL) in relation to device use indicated that most individuals fluent only in the oral language used hearing devices, whereas most students fluent only in BSL did not use them.

Of the 126 students, 18 (14%) were fluent in both BSL and oral language, 83 (66%) were fluent only in BSL, 12 (9%) were fluent only in oral language, and 13 (10%) were not fluent in either BSL or oral language – i.e., they are non-fluent in both communicative modalities. Of the 30 students fluent in oral language, 18 (60%) are also fluent in BSL.

DISCUSSION

BSL translators/interpreters and instructors are the professionals who spend the most time with deaf individuals at school. Hence, they can present a more critical view of the communicative modality used by students and their fluency level[10]. They employ and develop strategies to deal with written texts and oral discourses (encompassing the discursive dimension of language) to include deaf students in the learning/teaching process, constructing meaning in concrete statement situations[10,12]. Thus, these professionals play an essential role in the linguistic experiences of deaf students, enabling them to verify these students' communication fluency level.

This study defined deaf students based on the socio-anthropological perspective, in which deafness is a visual experience that restructures preconceived normality[5]. Students with mild hearing loss belong to the context of inclusive education, as provided by Law 13,146, of July 6, 2015, which establishes the Brazilian Law for the Inclusion of People with Disabilities, article 27, clause IV, which ensures that "bilingual education be offered in BSL as the first language and written Portuguese as the second language in bilingual schools and classes and inclusive schools"[13]. Deaf is used as a term to refer to all individuals with hearing loss at all levels of residual hearing or total absence of hearing. According to Decree no. 5,626, of December 22, 2005, article 2, "people are considered deaf when, due to hearing loss, they understand the world and interact with it through visual experiences, manifesting their cultures mainly by using the Brazilian Sign Language (BSL)" (single paragraph)[14]. Based on the results of this study, 119 out of the 126 accompanied students attending municipal schools had hearing loss equal to or higher than 41 dB; according to the abovementioned

decree, they are defined as individuals with hearing loss. Therefore, as all these students attend schools that use BSL for teaching, and they interact with the world through visual experiences, all students were classified as deaf.

The municipal school system of Belo Horizonte currently has more than 200 thousand students attending municipal schools. This study found a total of 144 deaf students enrolled in municipal schools, accompanied by BSL interpreters/translators and instructors. This number corresponds to 0.07% of all students enrolled in this school system. Seven out of every 10 thousand students enrolled in the municipal school system of Belo Horizonte are deaf. A study conducted in Marília, a municipality in the state of São Paulo, verified that less than 1% of all students enrolled in their municipal school system were deaf[15]. This information raises questions regarding the inclusion of deaf students in regular municipal schools. The setting of the present study was the municipality of Belo Horizonte and its school system. The low prevalence of deaf students enrolled in the system may be explained by the fact that the state school system absorbs deaf students in both regular and specialized schools.

This study found a higher frequency of students in Barreiro (21%) and Venda Nova (24%), which does not relate to the population density of these regions, which are not significantly more populated than the other regions[16]. The high number of deaf students enrolled in these regions is supposedly due to their proximity to the metropolitan area of Belo Horizonte.

This study classified fluency in oral language and BSL from the perspective of BSL interpreters/translators and instructors. Fluency is a term used differently in various areas, and it can be approached from quantitative and qualitative standpoints[17]. Quantitative approaches are measured with production indices and consider fluency as the capacity to unhesitatingly produce the language in a continuous flow. Qualitative approaches focus more on the context and define fluency as the spontaneous, easy, and precise use of the language. In this perception, fluency is related to linguistic performance, understood as the ability to draw the receiver's attention to what is conveyed in the message[18]. Despite the different concepts of fluency, authors unanimously consider that a person is fluent in a language when they present a continuous, uninterrupted discourse easily understood by the listener[19]. This study considered that individuals were fluent when they produced and understood a language, spontaneously communicating in a natural flow, from the standpoint of BSL interpreters/translators and instructors.

Fluency in BSL and oral language was compared with electronic device use, verifying that most (n = 22) of the individuals fluent in oral language (n = 29) used electronic hearing devices, indicating the importance of the device to oral language fluency[20]. On the other hand, among those who used electronic devices (n = 57), there were more students non-fluent (n = 35) than fluent in oral language (n = 22). Some authors have proved that even when exposed exclusively to oral language and having a therapeutic intervention, many deaf children who use cochlear implants or hearing aids do not have a good linguistic performance in oral language, in comparison with same-age hearing children[21,22]. The oral language performance of deaf children who use hearing devices can be influenced by various aspects, such as age when they became deaf, deafness etiology, degree of deafness, whether they have speech-language-hearing therapy, and whether they effectively use the device[22,23].

In this study, most children who used electronic devices and were fluent in oral language were also fluent in BSL. Individuals who use electronic devices and participate in bilingual settings possibly develop hearing and oral language skills similar to or better than those who participate only in oral settings[22,24]. Studies have demonstrated that deaf children who participate in bilingual settings developed excellent hearing and linguistic skills, in which BSL helped develop the language[22,23]. Studies on the satisfaction of deaf adults with the health care they received indicated that most participants were bilingual, indicating the importance of BSL and oral language[25-28]. In this context, BSL possibly represents an important contribution to these deaf students' oral language development.

A study on the importance of sign language to children who used cochlear implants pointed out that sign languages and oral languages are currently understood as competing offers[29]. However, this precept must be urgently dismissed, as sign languages do not hinder oral language learning; rather, they have increasingly recognized worth in the development of aspects representative of the cognition and language of deaf children who are already learning an oral language[30].

Children who use electronic devices have access to sound in order to improve their orality[20]. Nevertheless, many factors influence oral language acquisition[31]. Studies indicate that hearing losses

have been diagnosed late, impairing oral language development[32,33].

In the present study, the degree of deafness did not influence their fluency in either oral language or BSL. Students with mild to moderate hearing loss who used electronic devices were more fluent in BSL than in oral language. A piece of research assessed oral language performance in a child with moderate hearing loss who used electronic devices and observed less-complex aspects of communication and language. However, after speech-language-hearing therapy in combination with the electronic device efficiency, there was progress in linguistic aspects of orality[31]. Thus, when stating the effectiveness of speech-language-hearing therapy in combination with hearing gain provided by electronic devices, it is questioned whether students with mild to moderate hearing loss participated in a therapeutic setting that encouraged oral language development[34,35]. Another important point is the impact of family interactions on oral language development in children with hearing loss[36]. Family participation in the language development process and its combination with speech-language-hearing therapy contribute to more favorable results in oral language fluency[35-37].

The relationship between fluency in oral language and in BSL indicated that most students fluent in oral language were also fluent in BSL. The authors of an investigation that described the language acquisition process and deaf students' classroom strategies to learn to read and write unanimously gave priority to BSL as deaf children's first language[35,36]. BSL is considered a complex system of signs, essential to the development of cognition and social interaction, enabling them to carry out academic and social activities at school[24,38,39].

Advancements in scientific productions are needed to better understand how deaf people acquire BSL and oral language and how this process interferes with this population's communication, learning, and quality of life[30,33]. Further studies should be conducted, also addressing students' access to speech-language-hearing therapy, the time of device use, and the time of audiological diagnosis – which may clarify the findings about factors other than electronic device use that interfere with oral language fluency.

CONCLUSION

BSL was the communicative modality most used by deaf students accompanied by BSL interpreters/translators and instructors, including those who also used oral language. This preference for sign language was likewise observed more frequently in students who used electronic devices, indicating an actual change in social perception regarding deaf people, their language, and culture. This shows that hearing devices used in combination with BSL can improve school learning instruments, as they give people the possibility of being bilingual, using both oral and sign languages.

ACKNOWLEDGMENTS

Gratitude is extended to the Association of Deaf People of Minas Gerais (ASMG), the Brazilian Sign Language translators, interpreters, and instructors, the Minas Gerais State Foundation for Research Aid (FAPEMIG), and the Dean's office for research at UFMG.

REFERENCES

1. BRASIL, Instituto Brasileiro de Geografia e Estatística – IBGE. Censo 2010. Available at: https://censo2010.ibge.gov.br/noticias-censo?id=3&idnoticia=2170&view=noticia. Accessed 2019 nov 3.
2. UFMG - Para Surdos e Ouvintes - boletim número No 2056 - Ano 45 - Belo Horizonte, abril de 2019.
3. SMED - Secretaria Municipal de Educação de Belo Horizonte, DEID - Diretoria de Educação Inclusiva e Diversidade Étnico-Racial, 2019 IBGE - Instituto Brasileiro de Geografia e Estatística - Censo de 2010.
4. Monteiro MS. História dos movimentos dos surdos e o reconhecimento da Libras no Brasil. ETD - Educ Temática Digit. 2008;7(2):292. doi:10.20396/etd.v7i2.810
5. Gesueli ZM. Lingua(gem) e identidade: a surdez em questão. Educ e Soc. 2006;27(94):299-314. doi:10.1590/S0101-73302006000100013
6. Nóbrega JD, de Andrade AB, Pontes RJS, Bosi MLM, Machado MMT. Identidade surda e intervenções em saúde na perspectiva de uma comunidade usuária de língua de sinais. Cienc Saude Coletiva. 2012;17(3):671-9. doi:10.1590/S1413-81232012000300013
7. Barbosa FV. Avaliação das habilidades comunicativas de crianças surdas: a influência do uso da língua de sinais e do português pelo examinador bilingue [thesis]. São Paulo (SP): Universidade de São Paulo, Faculdade de Medicina; 2007 [accessed 2022 apr 4]. doi:10.11606/T.5.2007.tde-17022009-111331.

8. Martins VR de O, Albres N de A, Sousa WP de A. Contribuições da educação infantil e do brincar na aquisição de linguagem por crianças surdas. Pro-Posições. 2015;26(3):103-24. doi:10.1590/0103-7307201507805
9. BRASIL. Ministério da Educação. Secretaria de Educação Continuada, Alfabetização, Diversidade e Inclusão. Política nacional de educação especial na perspectiva da educação inclusiva. Brasília, DF: MEC, 2008. Available at: http://portal.mec.gov.br/arqui. Accessed 2019 oct 26.
10. Oliveira LF, Lima ILB. As concepções da surdez na voz dos intérpretes de. Rev Educ Espec Rev Educ Espec Publicação Contínua. 2019;32(e96):1-21. doi:10.5902/1984686X38515
11. PREFEITURA DE BELO HORIZONTE, Educação Inclusiva - 14 de Abril de 2019. Available at: https://prefeitura.pbh.gov.br/educacao/informacoes/pedagogico/educacao-inclusiva. Accessed 2019 oct 26.
12. Albres N de A, Rodrigues CH. The Roles of the Educational Interpreter: Between Social Practices and Education Policies. Bakhtiniana Rev Estud do Discurso. 2018;13(3):15-41.
13. BRASIL, Lei n° 13.146, de 6 de julho de 2015. Institui a Lei Brasileira de Inclusão da Pessoa com Deficiência (Estatuto da Pessoa com Deficiência). Available at: http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2015/lei/l13146.htm. Accessed 2019 nov 2.
14. BRASIL. Decreto no 5.626, de 22 de dezembro de 2005. Regulamenta a Lei no 10.436, de 24 de abril de 2002 e o artigo 18o da Lei no 10.098, de 19 de dezembro de 2000. Available at: http://portal.mec.gov.br/seesp/. Accessed 2019 nov 2.
15. de Resende AAC, de Lacerda CBF. Mapeamento de alunos surdos matriculados na rede de ensino pública de um município de médio porte do Estado de São Paulo: Dissonâncias. Rev Bras Educ Espec. 2013;19(3):411-24. doi:10.1590/S1413-65382013000300008
16. PNDU – Programa das Nações Unidas para o Desenvolvimento, Atlas de Desenvolvimento Humano da Região Metropolitana de Belo Horizonte. Available at: http://www.atlasbrasil.org.br/2013/pt/perfil_m/belo-horizonte_mg#idh. Accessed 2019 nov 1.
17. da Silva L, Stumpf MR. Fluência e acurácia em ouvintes usuários de Libras como segunda língua: autoavaliação de acadêmicos do Letras Libras. Leitura. 2017;1(57):252-85. doi: 10.28998/2317-9945.2016v1n57p252-285.
18. Lennon P. Investigating fluency in EFL: a quantitative approach. Language Learning. 1990;40(3):387-417. DOI: 10.1111/j.1467-1770.1990.tb00669.x
19. da Silva VLT. Estudo contrastivo entre a fluência oral em Português-LM inglês-LE de formandos em letras. Trab. Linguíst. 2000;35:95-115.
20. Geers AE, Mitchell CM, Warner-Czyz A, Wang NY, Eisenberg LS. Early sign language exposure and cochlear implantation benefits. Pediatrics. 2017;140(1):e20163489. doi:10.1542/peds.2016-3489
21. Fortunato CA de U, Bevilacqua MC, Costa MPR. Análise comparativa da linguagem oral de crianças ouvintes e surdas usuárias de implante coclear. Rev. CEFAC. 2009;11(4):662-72. doi:10.1590/s1516-18462009000800015
22. Scarabello EM, Lamônica DAC, Morettin-Zupelari M, Tanamati LF, Campos PD, Alvarenga KF et al. Language evaluation in children with pre-lingual hearing loss and cochlear implant. Braz J Otorhinolaryngol. 2020;86(1):91-8. doi:10.1016/j.bjorl.2018.10.006
23. Melo TM de, Yamaguti EH, Moret ALM, Bevilacqua MC. Auditory and language abilities in children with cochlear implants who live in bilingual homes: a cases report. Rev Soc Bras Fonoaudiol. 2012;17(4):476-81.
24. Nunes LROP, Braun P, Walter CCF. Procedimentos e recursos de ensino para o aluno com deficiência: o que tem sido disseminado nos trabalhos do GT 15 da ANPED sobre estes temas? Rev Bras Educ Espec. 2011;17(spe1):23-40. doi:10.1590/s1413-65382011000400004
25. Rezende RF, Guerra LB, Carvalho SAS. Satisfaction of deaf patients with the health care. Rev. CEFAC. 2020;22(5):e8119. doi:10.1590/1982-0216/20202258119
26. Rezende RF, Guerra LB, Carvalho SA da S. The perspective of deaf patients on health care. Rev. CEFAC. 2021;23(2):e0620. doi:10.1590/1982-0216/20212320620

27. Souza MFNS, Araújo AMB, Sandes LFF, Freitas DA, Soares WD, Vianna RSM et al. Main difficulties and obstacles faced by the deaf community in health access: an integrative literature review. Rev. CEFAC. 2017;19(3):395-405. doi:10.1590/1982-0216201719317116
28. Santos AS, Portes AJF. Perceptions of deaf subjects about communication in primary health care. Rev Lat Am Enfermagem. 2019;27:e3127. doi:10.1590/1518-8345.2612.3127
29. Haug T, Hennies J, Mann W. Deutsche gebärdensprache und ihre bedeutung für kinder mit cochlea-implantat. Schnecke Journal. 2012;76(juni):13-6.
30. Fitzpatrick EM, Hamel C, Stevens A, Pratt M, Moher D, Doucet SP et al. Sign language and spoken language for children with hearing loss: a systematic review. Pediatrics. 2016;137(1):1-17. doi:10.1542/peds.2015-1974
31. Onofre EG, Fernández SJM, Sargsyan-Sablong A. Des frontieres de la communication: entre l'oralisme et la langue des signes. e-Mosaicos. 2017;6(11):73-81. doi:10.12957/e-mosaicos.2017.28537
32. Lopes MP, Guarinello AC, Massi G, Berberian AP, Pacholek JSL. Caracterização dos pacientes com perda auditiva atendidos no serviço de fonoaudiologia de uma universidade em Curitiba - PR. Ciência e Cultura. 2013;1(47):213-25.
33. Jardim DS, Maciel FJ, Lemos SMA. Epidemiological profile of a hearing-impaired population. Rev. CEFAC. 2016;18(3):746-57. doi:10.1590/1982-021620161833115
34. Sobreira AC de O, Capo BM, Santos TS dos, Gil D. Desenvolvimento de fala e linguagem na deficiência auditiva: relato de dois casos TT - Speech and language development in hearing impairment: two-case report. Rev. CEFAC. 2015;17(1):308-17.
35. Walker EA. Evidence-based practices and outcomes for children with mild and unilateral hearing loss. Lang Speech Hear Serv Sch. 2020;51(1):1-4. doi:10.1044/2019_LSHSS-19-00073
36. Bittencourt ZZL de C, Françozo MFC, Monteiro CR, Francisco DD. Surdez, redes sociais e proteção social. Cienc. Saude Colet. 2011;16(suppl 1):769-76. doi:10.1590/s1413-81232011000700007
37. Sininger YS, Grimes A, Christensen E. Auditory development in early amplified children: Factors influencing auditory-based communication outcomes in children with hearing loss. Ear Hear. 2010;31(2):166-85. doi:10.1097/AUD.0b013e3181c8e7b6
38. Almeida DL de, Lacerda CBF de. Português como segunda língua: a escrita de surdos em aprendizagem coletiva. Trab em Linguística Apl. 2019;58(2):899-917. doi:10.1590/01031813865357 9436691
39. Freitas AR de, Amaral CMSR, Chaveiro N. O processo de escolarização do surdo usuário de libras e seus desafios: revisão de literatura. Rev Sinalizar. 2019;4:1-21. doi:10.5216/rs.v4.59340