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Impact of the teacher's voice in the classroom: a literature review

Impactos da voz do professor na sala de aula: revisão da literatura

Impactos de la voz del maestro en el aula: una revision de la literatura

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Abstract

Objective: *To realize a review of the literature about the impact of teacher's dysphonia on student learning.* ***Methods:*** *It was conducted a survey over the last 15 years in national and international literature, published in English, Portuguese or Spanish, using the MEDLINE, IBECS, LILACS and Web of Science. The following keywords and descriptors were used: voice disorders, dysphonia, dysphonic voice, voice quality, language tests, comprehension, speech perception and cognition.* ***Results:*** *Eight articles have included the proposed criteria in the last 15 years. It was found seven cross-sectional studies and a literature review, which were categorized by the authors as follow: dysphonia and language comprehension, dysphonia and language comprehension in noisy environments; perception of dysphonic voice, vocal quality and speech rate.* ***Conclusions:*** *Studies show that teacher's dysphonia interferes in the understanding of the message in the classroom, especially in noisy environments. The students evaluate the dysphonic voice negatively. The speech rate also presented as an important factor for language processing.*

Keywords: *Dysphonia; Voice Quality; Comprehension; Speech Perception,*

Resumo

Objetivo: *Realizar uma revisão da literatura referente aos impactos da voz do professor no contexto da sala de aula* ***Método:*** *foi realizado levantamento na literatura publicada nos idiomas inglês, espanhol*

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ou português, utilizando-se as bases de dados MEDLINE, IBECS, LILACS e Web of Science, dos últimos 15 anos. Foram utilizados os seguintes descritores e palavras-chaves: distúrbios da voz, disfonia, voz disfônica, qualidade da voz, testes de linguagem, compreensão, percepção da fala e cognição. ***Resultados:*** *sete estudos foram selecionados de acordo com o tema de investigação em uma busca realizada nos últimos 15 anos. Foram encontrados sete estudos transversais e uma revisão de literatura, categorizados pelas autoras, da seguinte forma: disfonia e compreensão da linguagem; disfonia e compreensão da linguagem em ambiente ruidoso; percepção da voz disfônica; qualidade vocal e velocidade de fala.* ***Conclusão****: Os estudos evidenciam que a disfonia do professor interfere na compreensão da mensagem transmitida pelo professor para os alunos, principalmente em ambientes ruidosos. A voz disfônica do professor é avaliada negativamente pelos alunos e a velocidade de fala mais lenta se apresenta como um fator importante para o processamento da linguagem, no contexto da sala de aula.*

Palavras-chave: *Disfonia; Qualidade da voz; Compreensão; Percepção da Fala*

Resumen

Objetivo: *revisar la literatura sobre los impactos de la voz del maestro en el aula.* ***Métodos:*** *Se realizó el estudio de la literatura publicada en inglés, español o portugués, usando las bases de datos MEDLINE, IBECS, LILACS y Web of Science, de los últimos 15 años. Se utilizaron los siguientes descriptores e palabras clave: trastornos de la voz, la voz disfonía, disfonía, calidad de voz, pruebas de lenguaje, comprensión, percepción del habla y cognición.* ***Resultados****: Se seleccionaron ocho estudios de acuerdo con el tema de la investigación registrados en los últimos 15 anõs. Se encontraron siete estúdios transversales y una revisión de la literatura, categorizados por los autores, de la siguiente manera: disfonía y comprensión del lenguaje, disfonia y comprensión del lenguaje en ambiente ruidoso, percepción de la voz de disfonia, calidad vocal y velocidad de la voz.* ***Conclusión****: Los estudios demuestran que la disfonía del maestro interfiere con la comprensión del mensaje transmistido por el para los estudiantes, especialmente en ambientes ruidosos. La disfonia del professor es evaluada negativamente por los estudiantes y la velocidad del habla, más lenta, se presenta como un factor importante para el procesamiento del lenguaje en el contexto del aula.*

Palabras clave: *Disfonía; Calidad de la Voz; Comprensión; Percepción del Habla*

Introduction

Teachers are considered the professional voice users most susceptible to vocal signs and symptoms [1]. The prevalence of dysphonia in that specific population ranges between 20–80% [2] and its effect is multidimensional, with a negative impact on the quality of life of teachers[2;3], communication in the classroom setting, and student learning [4].

The teacher's voice has been a frequent object of study of speech-language pathology. However, most of the studies primarily address the clinical issues related to dysphonia, and few have focused on the impact of the voice on the listener. The perception of dysphonia from the listener's perspective is relevant in the classroom environment, where students spend around 50% to 90% of their time listening to the teacher's voice [5].

The quality of the teacher's voice is a key factor in the teaching-learning process. The number of children affected by their teacher's voice problem may exceed the prevalence of dysphonia among teachers [4].

The classroom is a dynamic space of communication where language and the teacher's expressive resources promote social interactions. The type of voice of the teacher, in this setting, can be a motivating or discouraging factor for students [6;7].

Studies have shown that, when listening to a dysphonic voice, students allocate more of their working memory capacity to the perception and decoding of a message and less to the integration, elaboration, and comprehension of the message [8;9;10]. Moreover, there is evidence that the prosodic resources of speech also have an influence on student learning [11].

Authors have argued that dysphonic voices have a negative impact on the judgment of an

individual's personality and appearance. According to those authors, dysphonic voices elicit a higher number of negative responses related to personality and appearance [12;13].

The teacher, being a facilitator in the teaching-learning dynamic, plays the key role of eliciting changes in the students through the use of the voice. The students are engaged not only by the message conveyed by means of the voice, but they also interpret the content by analyzing the vocal quality of the speaker [6].

In light of the above, we believe this integrative literature review is an additional tool in the endeavor to understand and summarize the available body of research on the subject of the impact of the teacher's voice in the school setting. It could also help identify knowledge gaps and introduce alternatives to contribute to further research and an increasingly more critical practice in speech-language pathology.

The aim of the present study was to review the literature concerning the impact of the teacher's voice in the classroom.

Methods

An integrative literature review was performed comprising the following steps: 1) problem identification and formulation of the research question, 2) literature search, 3) description of the characteristics of the studies, 4) data evaluation, 5) analysis of results, and 6) presentation [14].

The research question of the present review was, "What is the impact of the teacher's dysphonic voice in the classroom setting?" The literature was searched for articles published in English, Spanish, or Portuguese using the databases MEDLINE/PubMed, Lilacs and IBECS via BVS Research Gateway, Web of Science and references listed in the selected articles. Initially, we searched articles that had been published over the last 10 years. However, given the paucity of available studies, the search parameters were extended to include articles published in the last 15 years (2001–2016). Once the electronic search was concluded, the retrieved articles were hand-searched for further references.

The search terms were "voice disorders" or "dysphonia" or "dysphonic voice" or "voice quality", connected by the Boolean operator AND to the terms "language tests" or "comprehension" or "speech perception" or "cognition". The Portuguese and Spanish translations of those terms were also used: *distúrbios da voz*; *trastornos de la voz; disfonia; disfonía; voz disfônica; qualidade da voz; calidad de la voz; testes de linguagem*; *pruebas del lenguaje; compreensão; comprensión; percepção da fala*; *percepción del habla, cogni*ção*, and cognición.*

In all, 710 articles were retrieved and independently screened by two researchers with respect to the pertinence of the selection and inclusion in the review. Initially, the screening focused on article titles and abstracts. The investigators read the full texts of the pre-selected studies to judge for or against the inclusion of each study. Studies were excluded if they consisted of literature reviews or were not directly related to the topic of the present review. The inclusion criteria were studies concerning the impact of the teacher's voice quality on the students and/or the students' perception of the teacher's voice. There was disagreement concerning one article included by one of the investigators. The article was excluded after consensus was reached. A total of 685 articles were excluded because they were not directly related to the review topic.

The final selection included five articles identified in the literature search and two articles from the references in the included studies, thus yielding a total of seven articles. The study flow diagram is given in Figure 1.

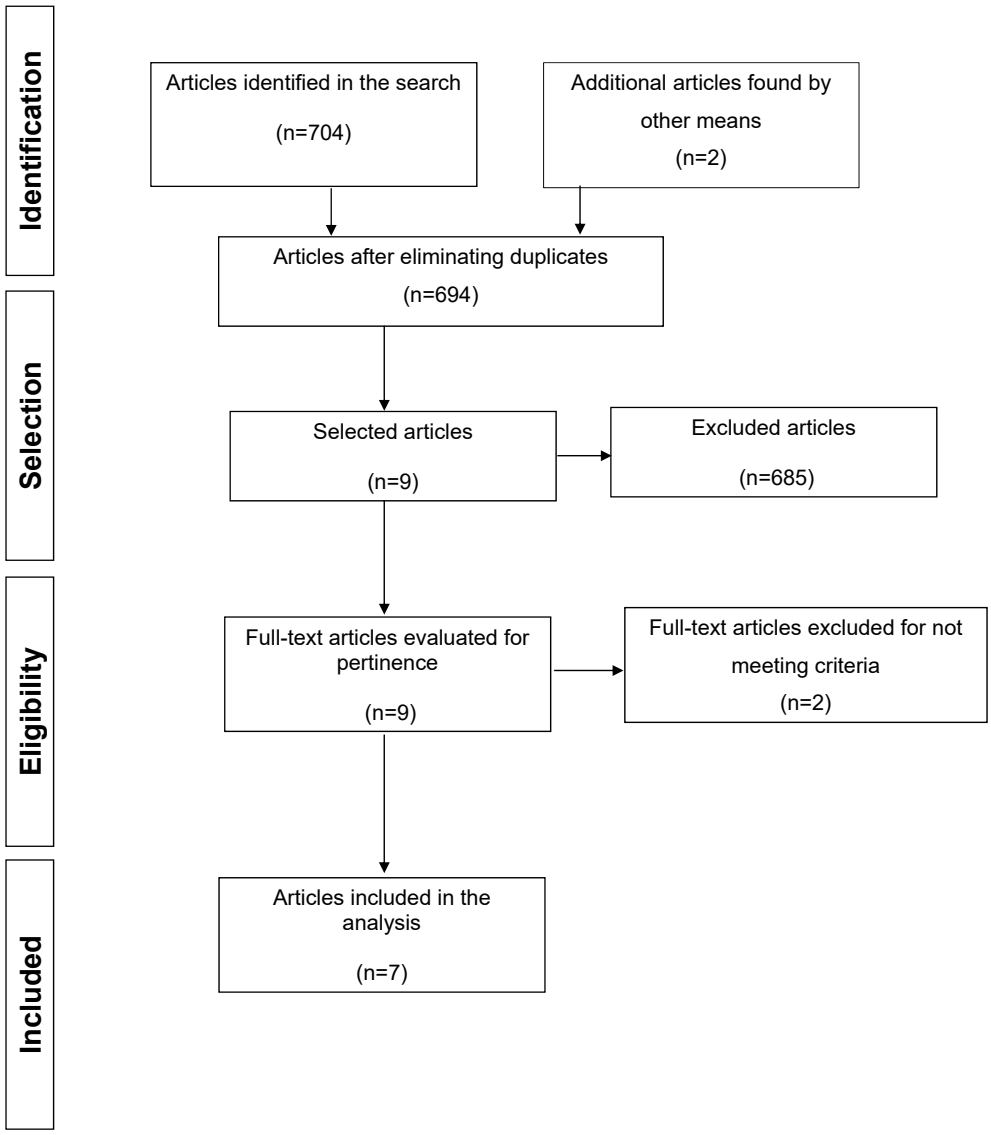

Figure 1. Article selection and analysis

The seven studies relevant to the research question were organized by the authors in four categories according to the guidelines for integrative reviews. The categories refer to the main subject of the articles. The studies were divided into "dysphonia and language comprehension"; "dysphonia and language comprehension in noisy environments"; "perception of the dysphonic voice", and "voice quality and speech rate". The following items were considered in the data evaluation stage: study location, design, sample (size and age range), objectives, main results, and categories of analysis, conducted by the authors.

Results

Seven studies spanning the last 15 years, all in English, fulfilled the inclusion criteria. Most of the studies were developed in Europe, with four (57.1%) in Sweden, one (14.3%) in Belgium, one (14.3%) in Ireland, and one (14.3%) in the United Kingdom.

With regard to the methodological approach of the selected articles, all seven (100%) were cross-sectional studies. The number of participants ranged from 24 to 107 individuals.

Figure 2. Summary of the selected and categorized articles

Author/ Year	Design	Location	Objectives	Sample	Main Results	Categorization
Morton & Watson 8 (2001)	Cross-sectional	Ireland	To evaluate the effect of severely dysphonic voices on the ability of children to process spoken language and to assess the perception of children regarding the dysphonic voice.	N= 24 (children aged 11 years)	The mean of the word retrieval task results was superior for the typical (80.5%) vs. the dysphonic voice (75.3%). In the comprehension task, the mean for the typical voice was 70.8% vs. 64.6% for the dysphonic voice. All the children were found to dislike the dysphonic voice, which they described as hoarse, breathy, rough, and unclear.	Dysphonia and language comprehension and Perception of the dysphonic voice
Rogerson & Dood 4 (2005)	Cross-sectional	United Kingdom	To evaluate the comprehension of students after listening to a typical vs. moderately and severely dysphonic voice	N= 107 (children aged 9–10 years)	The students performed better with the text read in a voice regarded as typical in relation to the moderately and severely dysphonic voices ($p < 0.001$). There was no statistically significant difference between the moderately vs. severely dysphonic voices in the students' performance.	Dysphonia and language comprehension
Morsomme et al. 9 (2011)	Cross-sectional	Belgium	To evaluate the impact of a dysphonic voice on language processing skills and to assess the perception dos students regarding the dysphonic voice.	N= 68 (children aged between 7–9 years)	The results suggest that dysphonic voices have a negative impact on the performance of children on language tests; the impact is more pronounced in discrimination tasks. Negative terms such as "sad", "ugly", and "broken" predominated in the description of the dysphonic voice (98.33%).	Dysphonia and language comprehension and Perception of the dysphonic voice
Haake et al. 11 (2014)	Cross-sectional	Sweden	To evaluate the impact of the speech rate on the performance of children on the Test for Reception of Grammar (TROG - 2)	N = 102 (children aged between 5–6 years)	The mean results for TROG – 2 show the negative impact of increased speech rate on language processing.	Voice quality and speech rate; Language comprehension
Lyberg-Åhlander et al. 15 (2015)	Cross-sectional	Sweden	To assess the relationship between voice quality and the performance of children on language comprehension tests	N = 86 (children aged 8 years)	The results demonstrated that the children who took the test with the dysphonic voice had poorer outcomes in the more complex tasks.	Dysphonia and language comprehension
Lyberg-Åhlander et al. 16 (2015)	Cross-sectional	Sweden	To evaluate the impact of a dysphonic voice on the performance of children on the Test for Reception of Grammar (TROG – 2) in a noisy environment	N= 93 (children aged 8 years)	The effect of the voice quality on the performance of children on the language processing test varies depending on the background noise and the complexity of the task. The dysphonic voice and the background noise demanded greater allocation of cognitive capacity for the perception of the spoken message, which could negatively affect language comprehension.	Dysphonia and language comprehension in a noisy environment
Brännström et al. 17 (2015)	Cross-sectional	Sweden	To assess the opinion of the children regarding a typical vs. dysphonic voice after they performed the Test for Reception of Grammar (TROG – 2)	N = 100 (children aged between 8–9 years)	The dysphonic voice is perceived negatively by the children. They described it as "stressed", "repetitive", and "unclear".	Perception of the dysphonic voice

The studies demonstrate the impact of the teacher's dysphonic voice on the comprehension of spoken language [4;8;9;15], especially in noisy environments [16]. In addition, it was noted that children rate negatively the voice of teachers with dysphonia [8;9;17]. The studies also show the influence of speech rate on the comprehension of the message [11].

Figure 2 gives a summary of the selected articles and the categorization adopted in the present study.

Discussion

The present study is an integrative review of the literature aimed at identifying and analyzing the available scientific literature addressing the effects of the teacher's voice in the classroom setting.

The present review made it clear that studies addressing the impact of dysphonic voices in the classroom are still scarce. Most of the articles were cross-sectional and conducted in Europe.

One of the effects of the teacher's dysphonic voice in the classroom setting is that students need to use more of their cognitive capacity for comprehension, since they are required to cope with more than one competing noise. As students attempt to filter out the noisy voice input, a smaller proportion of the cognitive capacity is available for language processing. Thus, the working memory, which is responsible for the processing and short-term storage of the information received, may prove insufficient, with more resources employed in processing and less capacity allocated for storage [16;18.]

Four of the included studies show that students perform more poorly on language comprehension tests when exposed to dysphonic vs. typical voices, particularly when tackling more complex tasks such as the processing of longer sentences [4;8;9;15]. The reviewed articles also underline that the alteration found in discrimination tasks could be due to the distortion of voiceless and voiced phonemes likely generated by the teacher's dysphonia [9]. As a result, the student, in order to comprehend what is heard relying on the lexical context, uses more of their perceptual processing capacity, which limits the auditory resources available for the comprehension of the information received [4;8;9;15;16].

Regarding the perception of dysfunctional voices, it is known that, by and large, dysphonic voices are negatively judged by listeners [12;13]. Such voices tend to be monotonous and to show limited pitch variation, which may make it harder for students to sustain their attention in the message transmitted by the teacher [17]. Thus, the student--teacher interaction, when influenced by dysphonia, may be disrupted and the teaching-learning process may be hampered. Morton & Watson[8] noted that children responded negatively to dysphonic voices, describing them as rough and unclear. Morsomme et al. [9] also reported negative reactions of students to a dysphonic voice, and noted predominance of emotionally charged terms such as "sad" and "ugly". Furthermore, those authors observed that over half of the students used at least one term denoting pathology, such as "sick" and "broken". Brännström et al.[17] obtained similar results, with children referring to the dysphonic voice as repetitive and poor and also emphasizing its lack of clarity. In addition, the same study revealed that poor outcomes in language tests are associated with a more negative rating of the dysphonic voice, which clearly indicates the relationship between dysphonia and learning.

Of note, the literature shows that expressive teachers introduce appropriate pauses, include variation in prosody and speech rate, have precise articulation, and use adequate pitch to sex and age [5-7;19]. Considering that students are continually judging the teacher's voice, it plays an important motivational role in the educational process.

Only two studies took into account the grade of dysphonia in the analysis[4;8]. Research has shown that moderate and severe dysphonia have a negative impact on the performance of children on language tests. It should be noted that there are no established vocal standards to define when an individual can be considered dysphonic. Authors have argued that the criteria to distinguish dysphonic from typical voices are given by listeners, as voice dysfunctions are closely related to an individual's social and cultural milieu [20]. Therefore, a voice categorized as dysphonic by a professional could be considered pleasant and motivating by a student, without necessarily having an impact on the teacher's communication ability or professional activity.

A number of studies indicate that the grade of voice problem most frequently found among teachers is mild dysphonia[21;22]. In view of that, it is important to consider the impact of the severity of dysphonia on the teacher's expressiveness, since more severe dysphonia can negatively affect communication and the proper use of oral expressiveness. Therefore, we encourage further studies addressing mild dysphonia in relation to the expressiveness of the teacher's speech.

With regard to prosodic features, speech rate is a very relevant factor in the understanding of the message. The rate of the speech can convey a feeling of hurry, monotony, demotivation, and frequently hamper language processing. Authors have assessed the expressiveness of a female university professor highly rated by her students and found that, among other aspects, variation in speech rate

was associated with better expressiveness[7]. Another author reported that an increased speech rate have a negative influence on the performance of students on language tests. Conversely, reduced speech rate can help improve the outcomes of those students, especially in language processing after exposure to a given stimulus, that is, in offline language processing[11]. Prosodic characteristics such as adequate pauses, precise articulation, and lower speech rate are key resources for a teacher's expressiveness [19]. Those resources help in the modulation of the voice in the classroom and to capture the students' attention, reinforcing the importance of the voice as a didactic tool in the educational process.

It is also noteworthy that, in the reviewed studies, students' ages ranged from 5 to 11 years. Considering that children aged 6–12 years have less flexible perceptual skills, the comprehension of a dysphonic voice becomes an even more complex task[23], since that type of voice represents an additional competing stimulus demanding increased attention from the students.

Despite the paucity of studies on the subject of the present literature review and using different methodologies, the conclusions of the available studies converge to a fundamental point: a teacher's dysphonic voice could hamper the transmission of the message and compromise comprehension by the students, and, for that reason, dysphonia in teachers warrants special care. Students are engaged by the message received through the voice and interpret the content taking into account the speaker's voice quality[6]. Therefore, it is fundamental that further research be developed in this area in order to evaluate the impact and foster public policies to improve the conditions for communication in the workplace and the teaching process.

Conclusion

Most studies in the literature addressing the influence of voice quality on student learning are descriptive and have been conducted with children aged 5–11 years. The studies show that a teacher's dysphonic voice is rated negatively by the students and could become a discouraging factor in the classroom and hamper the effective comprehension of the message transmitted by the teacher to the students.

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