Auditory impressions of the teacher's voice in the perception of students, teachers and naive people

Impressões auditivas da voz do professor na percepção de alunos, professores e leigos

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ABSTRACT

Purpose: Compare the auditory perceptions of students, teachers and naive people regarding the voice, in elementary school teaching. **Methods:** It is a cross-sectional study composed by three groups of 104 students, 40 teachers and 40 non-teachers. The object of the research was a 14-voice bank, composed by the voice of an actress. The participants pointed out which voices they would choose for an elementary school teacher, indicating if the voices were pleasant, motivating and able to arouse attention. **Results**: The preferred voices were of neutral vocal quality (95.1%), bass pitch (75%) and slow speed (67.9%), considered pleasant, motivating and able to arouse attention. The less chosen voices were the moderate breathy (98.4%), intense breathy (97.3%), mild rough (94.6%), moderate rough (94.0%), intense rough (94.6%) and with imprecise speech articulation (94.0%), all of them with negative vocal psychodynamic. Proportionally, the bass voice was the most chosen by teachers (95%). The slow speed, strong intensity and mild breathy voices were more marked by naive people (90%, 52.5%, 37.5%) and the students reported less the mild rough (1.9%) and moderate rough (1.9%) ones. **Conclusion:** Voices of neutral vocal quality, of bass pitch and with slow speech speed are the preferred ones for a teacher of elementary school, considered pleasant, motivating and able to arouse attention. The voices with imprecise speech articulation, moderate and intense rough and breathy are not well accepted and the psychodynamic is negative. Teachers appreciate more the bass pitch; naive people, the slow speech speed, mild breathy and strong intensity; and students evaluate negatively the rough voices.

Keywords: Voice; Teachers; Dysphonia; Voice quality; Auditory perception; Speech-language pathology

RESUMO

Objetivo: Comparar as impressões auditivas de estudantes, professores e leigos para a voz, na docência do ensino fundamental. **Métodos:** Estudo transversal formado por três grupos: 104 alunos; 40 professores e 40 não professores. O objeto de estudo foi um banco de 14 vozes, composto pela voz de uma atriz. Os participantes assinalaram as vozes preferidas para uma professora do ensino fundamental, indicando se eram agradáveis, motivadoras e capazes de despertar atenção. **Resultados:** As vozes preferidas foram de qualidade vocal neutra (95,1%), *pitch* grave (75%) e velocidade lenta (67,9%), consideradas agradáveis, motivadoras e capazes de despertar atenção. As vozes menos escolhidas foram soprosa moderada (98,4%) e intensa (97,3%), rugosa leve (94,6%), moderada (94,0%) e intensa (94,6%), com articulação de fala imprecisa (94,0%), todas com psicodinâmica vocal negativa. A voz grave foi, proporcionalmente, a mais escolhida pelos professores (95%). As vozes de velocidade lenta, intensidade forte e soprosa leve foram mais assinaladas pelos leigos (90%, 52,5% e 37,5%) e os alunos indicaram menos as vozes rugosas leves e moderadas (1,9%). **Conclusão:** Vozes de qualidade vocal neutra, de *pitch* grave e com velocidade de fala lenta são as preferidas para uma professora do ensino fundamental, consideradas agradáveis, motivadoras e capazes de despertar a atenção. Vozes com articulação de fala imprecisa, rugosas e soprosas moderadas e intensas não são bem aceitas e a psicodinâmica é negativa. Professores valorizam mais o *pitch* grave; leigos, a velocidade de fala lenta, soprosidade leve e intensidade forte e os alunos são os que mais avaliam negativamente as vozes rugosas.

Palavras-chave: Voz; Docentes; Disfonia; Qualidade da voz; Percepção auditiva; Fonoaudiologia

INTRODUCTION

The voice is one of the teacher's tools of work, mediator of the teaching-learning process, in which the linguistic discourse is linked to the information and the extralinguistic vocalization, to the emotional impact[1,2]. Thus, in the classroom, the student listens to the teacher and, at the same time, triggers projections and feelings, involved by the information and the way the content is transmitted[2-4].

In each teaching cycle, the teacher tends to present a voice preferred by the students. For children up to 6 years old, the teacher's voice has usually expressive modulation, strong intensity and higher vocal quality, which transmits security, affection and joy. For children between 7 and 14 years of age, the preferred vocal traits are medium frequency, appropriate speed to the subject and laryngopharyngeal resonance, which conveys confidence and authority[5,6]. Studies have shown that a teacher's preferred voice has a suitable pitch for sex and age, appropriate loudness for the subject, precise articulation, adequate speed and expressive speech modulation[7-9].

If the communicative process in the school context involves content and form, it is therefore necessary to understand how the vocal quality of the teacher is perceived by the students, especially in view of the epidemiological scenario of high prevalence of dysphonia in teachers[10,11] and of the large number of children affected by teacher's voice problems[1].

It is emphasized that the perception of vocal quality is subjective, based on personal criteria, comprehension skills, experience and previous impressions of the listener[3,12], or by professional demands, which shows its importance, within a communicative process[13,14]. In this aspect, it was observed that many studies have investigated the teacher's voice[10,11] and few have explored the impacts and impressions of their voice by the listeners[1,2,15,16], who are consciously or not influenced by the voices they listen to.

It is believed that exploring how the voice of the teacher is perceived by the listeners will contribute to its appreciation as a tool of work and also as an important didactic resource in the classroom, improving more and more the speech pathology approach, sensitizing the teachers themselves and the public health and education policies for the subject. For this, the objective of this study was to compare the auditory impressions of students, teachers and naive people for the voice, in the teaching of the elementary school.

METHOD

An analytical, cross - sectional, observational study approved by the Comitê de Ética em Pesquisa (Research Ethics Committee) - CEP - UFMG, under ETIC nº 1,138,043. The study was composed of 184 individuals, divided into three groups: GA (grupo de alunos, group of students), formed by 104 students, 67 girls and 37 boys, with a mean age of 12.39 years; GP (grupo de professores, group of teachers), consisting of 31 women and nine men, mean age 38.90 years. GL (grupo leigo, naïve group), formed by 40 non-teachers, 31 women and nine men, with a mean age of 38.55 years. Of these, 47.50% were health professionals, 35% administrative

professionals and 17.50% employees who worked with general services. The inclusion criteria for GA were to be a student from the sixth to the ninth grade of elementary school, regardless of age or gender. For the GP, inclusion criteria were to be an elementary school teacher of any age or gender, regardless of the teaching time. Regarding the GL, the research included individuals living in the study city, of any gender, between 18 and 60 years of age, except teachers. The groups of students and teachers were recruited in the same public institution of education of Belo Horizonte (MG) and the GL was recruited in different regions of the city. It is important to highlight that, according to Ordinary Law 11274/06[17], the elementary education in Brazil currently lasts nine years and is divided into three cycles: 1st cycle (6 to 8 years), 2nd cycle (9 to 11 years) and 3rd cycle (12 to 14 years).

Participants with self-reported or parental reported (GA) complaints or hearing loss and those who did not understand or inadequately filled out the proposed evaluations for the research were excluded.

Procedures and instruments for data collection

Construction of the object of study

A bank with 14 voices was built by the researchers to be the object of study. In the first stage, an experienced actress with neutral voice, produced by the speaker without effort, with adequate pitch to sex and age, balanced resonance, loudness, adequate modulation and speech speed, with precise articulation, was invited to participate in the research. The vocal quality characteristics were confirmed by means of auditory-perceptive speech pathology evaluation of the voice and by clinical assessment, which revealed laryngeal and otorhinolaryngological examination within normality patterns. Both procedures were performed by volunteer experts and external to the research.

In the second stage, the actress was oriented to record the phrase: *"Hello! Come and be my student next year. I wait for you!"*. The phrase is motivational and refers to the beginning of classes. The task orientation was for her to avoid changes in the prosody of the sentence, to be as natural as possible and, by means of different interpretations, to record the same sentence in ten different ways: neutral voice, mild rough voice, moderate rough voice, intense rough voice, mild breathy voice, moderate breathy voice, intense breathy voice, strong intensity voice, weak intensity voice and with imprecise speech articulation.

For this task, the researchers performed a previous training with the volunteer, explained the auditory-perceptive characteristics that should be produced and what their pathophysiological correlates were. Anchor stimuli were provided as examples of the voices so that she could study the variations and perform the interpretations. After several rehearsals with the researchers, the actress recorded 30 sentences, that is, three examples for each type of voice. In voices of strong and weak intensity, the researchers controlled so that there was no breathiness or excess of strength.

The recording was performed in an acoustically treated environment using a Dell® computer, Optiplex GX260 model, equipped with a Direct Sound® professional sound card and Shure® omnidirectional condenser pedestal type microphone.

The microphone was located 5 cm from the mouth and with a 90° directional pickup angle.

In the third stage, the researchers selected the three neutral voice recordings of the actress and performed an audio edition of the voice frequency and speed through the FonoTools Lite (CTS Informática) and Audicity programs, version 2.1.2® (Audacity Developer Team). The frequency alteration was performed by modifying 1.5 semitones up and down. The utterance rate of 5.10 was changed to 7.81 and 3.27, in that order. At the end of the stage, the researchers obtained three examples of each type of voice - voice with bass pitch, voice with treble pitch, voice with fast speed and voice with slow speed -, totaling 12 voices.

The fourth stage consisted of the validation of the object of study by three volunteer speech pathologists, specialists in voice, and blindly. They were oriented to select, among the 42 initial voices, which was perceptibly the most faithful and most natural for the following voices: neutral, mild roughness, moderate roughness, intense roughness, mild breathiness, moderate breathiness, intense breathiness, treble pitch, bass pitch, inaccurate speech articulation, slow speed, fast speed, strong intensity and weak intensity - no other information was passed on to them. Thus, the initial bank of 42 voices was restricted to 14 voices.

Questionnaire for sociodemographic and auditory-perceptive evaluation of the groups

The researchers elaborated a questionnaire, in which the first part comprised questions about the sociodemographic data of the groups and the second part, items for recording of the impressions of the participants regarding vocal preference. The participants were placed in a circular table of 1.5-meter radius, in a silent place, with noise less than 60 dB. The voices were presented to the groups one by one, twice each. In the first auditory-perceptive evaluation, the participants individually pointed out if they would choose one of the voices presented for a elementary school teacher. For the second time, the participants indicated, on a numerical scale from 1 to 5, how much the voice was pleasant (harmonious and pleasant voice to listen), motivating (charismatic and captivating voice) and capable confident voice that arouses interest) in the classroom.

Data analysis

It was performed a descriptive analysis of the frequency distribution of the categorical variables and analysis of the measures of central tendency and of dispersion for continuous variables. For inferential analysis, the following tests were performed: of proportion, Pearson's chi-square and Fisher's exact test. For statistical analysis, it was considered 5% of significance.

RESULTS

It was observed that the preferred voice for teaching, in the judgment of the participants, was the voice with neutral quality (95.1%), followed by the bass voice (75%) and the slow speed voice (67.9%). The less preferred voices were of moderate (98.4%) and intense (97.3%) breathiness, mild (94.6%), intense (94.6%) and moderate roughness (94.0%), and of imprecise speech articulation (94.0%). The general preference of the studied groups, by the presented voices, is shown in Table 1.

The bass voice was the most chosen by the teachers (95%). The voices of slow speed, strong intensity and mild breathiness were more marked by the naive group (90%, 52.5% and 37.5%, respectively) and, among the students, the moderate rough and mild rough voices were the least chosen ones (1.9% and 1.9%). Table 2 shows that, among the voices, the auditory impressions differed among the groups (p≤0.05).

The neutral and bass voices were considered pleasant, motivating and able to arouse attention. The slow voice, though considered pleasant, was not appreciated as motivating or able to arouse attention. The strong voice, though indicated as motivating and able to arouse attention, was not considered pleasant. The fast speed voice did not arouse attention, while the mild breathy voice was not considered motivating and able to arouse attention.

The weak, treble, with imprecise speech articulation, intense breathiness, intense roughness, mild roughness, moderate roughness and moderate breathiness voices were not considered pleasant, motivating or able to arouse attention. Table 3 presents the analysis between the type of voice and the characteristics of pleasantness, motivation and ability to arouse attention.

Table 1. General vocal preference

	Yes	%	No	%	Total
Neutral voice	175	95.1	9	4.9	184
Bass voice	138	75.0	46	25.0	184
Slow speed	125	67.9	59	32.1	184
Strong voice	64	34.8	120	65.2	184
Fast speed	54	29.3	130	70.9	184
Mild breathy voice	45	24.6	138	75.4	183
Weak voice	27	14.7	157	85.3	184
Treble voice	13	7.1	171	92.9	184
Moderate rough voice	11	6.0	173	94.0	184
Imprecise articulation	11	6.0	173	94.0	184
Intense rough voice	10	5.4	174	94.6	184
Mild rough voice	10	5.4	174	94.6	184
Moderate breathy voice	3	1.6	181	98.4	184
Intense breathy voice	5	2.7	179	97.3	184

Table 2. Evaluation of the voices considered more adequate for teaching, by groups of students, teachers and naive people

Type of Voices	Students (n=104)			Teachers (n=40)			Naive people (n=40)			Value of p
	%	CI 95%		%	CI 95%		%	CI 95%		
Neutral voice	95.1	90.9	99.3	97.5	92.6	100.0	92.5	84.2	100.0	0.544
Bass voice	66.0	56.8	75.3	95.0	88.1	100.0	77.5	64.3	90.7	**<0.001***
Slow speed	59.2	49.6	68.8	67.5	52.7	82.3	90.0	80.5	99.5	**<0.001***
Fast speed	26.2	17.6	34.8	30.0	15.5	44.5	35.0	19.9	50.1	0.296
Strong voice	22.3	14.2	30.5	47.5	31.7	63.3	52.5	36.7	68.3	**0.017***
Mild breathy voice	19.4	11.7	27.1	25.0	11.3	38.7	37.5	22.2	52.8	**0.024***
Weak voice	11.7	5.4	17.9	15.0	3.7	26.3	22.5	9.3	35.7	0.101
Treble voice	9.7	3.9	15.5	2.5	0.0	7.4	5.0	0.0	11.9	0.147
Imprecise articulation	4.9	0.7	9.1	5.0	0.0	11.9	7.5	0.0	15.8	0.544
Intense breathy voice	4.9	0.7	9.1	-	-	-	-	-	-	-
Intense rough voice	3.9	0.1	7.7	5.0	0.0	11.9	10.0	0.5	19.5	0.073
Mild rough voice	1.9	0.0	4.6	7.5	0.0	15.8	12.5	2.1	22.9	**0.008***
Moderate rough voice	1.9	0.0	4.6	12.5	2.1	22.9	10.0	0.5	19.5	**0.029***
Moderate breathy voice	1.9	0.0	4.6	-	-	-	2.5	0.0	7.4	0.821

Proportion test (Stata version 12.0); *value of p<=0.05
Subtitle: CI- Confidence Interval

Table 3. Comparison of the types of voices with the perception of pleasantness, motivation and attention

Types of Voices	Perception	No (%)	Yes		Value of p
			%	CI 95%	
Neutral voice	Pleasant	7.61	92.39	88.56-96.26	<0.001*
	Motivation	9.29	90.71	86.50-94.92	<0.001*
	Attention	14.21	85.79	80.73-90.85	<0.001*
Bass voice	Pleasant	28.02	71.98	65.45-78.50	<0.001*
	Motivation	31.32	68.68	61.94-75.42	<0.001*
	Attention	33.88	66.12	59.26-72.98	<0.001*
Slow speed	Pleasant	18.48	81.52	75.91-87.13	<0.001*
	Motivation	43.72	56.28	49.10-63.47	0.089
	Attention	48.09	51.91	44.67-59.15	0.605
Fast speed	Pleasant	50.55	49.45	42.19-56.71	0.882
	Motivation	56.59	43.41	36.21-50.61	0.075
	Attention	57.38	42.62	35.46-49.79	0.046*
Strong voice	Pleasant	66.12	33.88	27.02-40.74	<0.001*
	Motivation	41.76	58.24	51.08-65.41	0.026*
	Attention	35.52	64.48	57.55-71.41	<0.001*
Mild breathy voice	Pleasant	52.75	47.25	40.00-54.51	0.459
	Motivation	73.91	26.09	11.53-30.80	<0.001*
	Attention	72.68	27.32	20.87-33.78	<0.001*
Weak voice	Pleasant	64.67	35.33	28.42-42.23	<0.001*
	Motivation	85.25	14.75	9.62-19.89	<0.001*
	Attention	83.06	16.94	11.51-22.37	<0.001*
Treble voice	Pleasant	90.16	9.84	5.52-14.15	<0.001*
	Motivation	86.96	13.04	8.18-17.91	<0.001*
	Attention	76.50	23.50	17.35-29.64	<0.001*
Imprecise articulation	Pleasant	90.11	9.89	5.55-14.23	<0.001*
	Motivation	91.80	8.20	4.22-12.17	<0.001*
	Attention	85.33	14.67	9.56-19.79	<0.001*
Intense breathy voice	Pleasant	94.51	5.49	2.18-8.81	<0.001*
	Motivation	97.28	2.72	0.37-5.07	<0.001*
	Attention	93.44	6.56	2.97-10.14	<0.001*
Intense rough voice	Pleasant	96.72	3.28	0.70-5.86	<0.001*
	Motivation	94.51	5.49	2.18-8.81	<0.001*
	Attention	81.52	18.48	12.87-24.09	<0.001*

Proportion test (Stata version 12.0); *value of p<=0.05
Subtitle: CI- Confidence Interval

Table 3. Continued...

Types of Voices	Perception	No (%)	Yes		Value of p
			%	CI 95%	
Mild rough voice	Pleasant	91.80	8.20	4.22-12.17	<0.001*
	Motivation	87.98	12.02	7.31-16.73	<0.001*
	Attention	76.63	23.37	17.26-29.48	<0.001*
Moderate rough voice	Pleasant	93.44	6.56	2.97-10.14	<0.001*
	Motivation	90.71	9.29	5.08-13.50	<0.001*
	Attention	76.09	23.91	17.75-30.08	<0.001*
Moderate breathy voice	Pleasant	96.72	3.28	0.70-5.86	<0.001*
	Motivation	94.54	5.46	2.17-8.76	<0.001*
	Attention	88.59	11.41	6.82-16.01	<0.001*

Proportion test (Stata version 12.0); *value of p<=0.05
Subtitle: CI- Confidence Interval

DISCUSSION

According to the perception of students, teachers and naive people, the preferred voices for a elementary school teacher were those with neutral vocal quality, bass pitch and slow speech speed (Table 1). It is believed that this preference is directly linked to the teaching work, which demands efficient and attentive communication to the emotional and social demands of the students[18], as well as to the fact of conveying credibility and knowledge of the developed subject[19].

Under the reference of vocal psychodynamics, the neutral vocal quality is related to the idea of clarity, pleasantness and easiness for an effective communication with the students, which agrees with the literature[5,6]. The modulation of the pitch indicates the intention of the speech[20] and some authors associate the bass voice with vocal charisma, energy, maturity and safety[21,22], attributes valued for the teaching. The speech speed is linked to the mental organization of the speaker[20] and, being slow on the part of the teacher, positively influences the reception and processing of the message by the students, in the context of the classroom[23].

It was observed that the rough voices, of moderate and intense breathiness and imprecise articulation were the least chosen by the groups. The intense rough voices are perceived as stressed ones, difficult to be heard, broken, sick and repetitive[2,15,16]. The articulatory inaccuracy is seen as negative for the teacher's good expressiveness[7,8], which also affects the students, since they listen to the teacher's voice around 50% to 90% of the time they remain in the classroom[24].

When comparing the vocal choice among the groups (Table 2), it was observed that the teachers pointed out more the bass voice. It is believed that this preference relates to the psychodynamics of the bass voice, which transmits authority, energy and maturity. A research showed that teachers believe the appropriate voice to the teacher should present a bass pitch with increased loudness, to ensure authority and respect by the students in the fulfillment of the activities[22].

The naive people pointed out more the voices of slow speed, strong intensity and mild breathiness, which are supposed to meet the idea that the teacher's voice should convey clarity, authority and vitality, characteristics related to the psychodynamics of these voices[20]. Studies have pointed out that slow speed can favor the processing of the message in the classroom[4,23] and that

strong intensity is one of the aspects of maintaining student's attention[4,8]. Regarding to the mild breathiness, it is believed that this acceptance is related to the mild degree of breathiness, which does not cause discomfort to the listener and is culturally associated with the aspect of female sensuality[20].

The students formed the group that most negatively received the mild and moderate rough voices. These voices are characterized by transmitting the sensation of fatigue, stress, weakness and exhaustion[20]. Studies have shown that the dysphonia has an unfavorable repercussion on the students[1,2,4,15,16] and that they present negative reactions to the dysphonic voice, characterizing it as rough, difficult to hear, repetitive, poor, sick and broken[2,15,16].

Table 3 shows that the voices of neutral vocal quality, bass pitch and slow speed were associated with a positive psychodynamic, desirable for a school context, because they were considered pleasant, motivating and able to arouse attention, which is in agreement with the literature found[8].

It was also observed that the strong voice was considered motivating and able to arouse attention. In the referential of vocal psychodynamics, the increased loudness conveys the idea of vitality and energy[20]. The hypothesis of this study is that, considering the school context, it is important for the teacher to undertake a strong voice that arouses attention and motivates the student, but its use throughout the school period may not be pleasant. Likewise, the slow speed voice, indicated as pleasant, was not considered able to arouse attention and motivate the student. It's interesting to note that both voices were preferred by naive people (Table 2), individuals who do not live the day to day in a classroom. The data show the importance of considering the teacher's voice as a work tool, stimulus to the learning and building of knowledge[25].

In contrast, the weak, treble, of imprecise speech articulation, intense breathiness, of mild, moderate and intense roughness and moderate breathiness voices were negatively evaluated by the individuals, in relation to the pleasantness, motivation and ability to arouse attention. The psychodynamics of these voices can transmit tiredness, stress, exhaustion, weakness, childishness, difficulty in the mental organization and disinterest in communicating, undesirable characteristics in the school context[20]. Studies show that the voice with more intense roughness was negatively evaluated by the individuals[2,15,16].

The fast, strong and mild breathy voices were not well evaluated by most of the participants. Generally, the psychodynamics of these voices can transmit weakness, lack of education and

patience, fragility, shyness or difficulty in mental organization[20], which may explain the negative evaluation. It is also believed that these voices, as evidenced in the literature[2,15], may have negative repercussion in the students' perception.

The study reinforced the importance of the teacher's voice as a work instrument, a relevant didactic resource[7,25] and a potential teaching tool. The theme deserves attention from teachers, speech pathologists and public policies on health and education. Several studies suggest more comprehensive promotion actions of the teacher's voice health[22], with proposals for health promotion in schools and actions guided by integrity, interdisciplinarity and intersectoriality[10,22].

It is considered that the study presented some limitations, such as the small number of male teachers (n = 9), which made it difficult the comparison between the preference or not of the types of voices in relation to sex, and regarding the object of study, which, although methodologically cared, was constructed using a human voice. It is believed that, in the near future, studies like this will use synthesized voices, with refinements such as naturalness, not obtained in this research.

CONCLUSION

In the perception of students, teachers and naive people, the preferred voices for the teaching of elementary school children are those ones of neutral vocal quality, bass pitch and slow speech speed, which, under the referential of the vocal psychodynamics, are considered pleasant, motivating and able to arouse attention. Voices with imprecise speech articulation, rough and moderate and intense breathy are not well accepted and the psychodynamics of these voices are negative. Teachers value the bass pitch of the voice; the naive people, the slow speech speed, the strong intensity and the mild breathiness voices, and the students are the ones who most negatively assess the rough voices.

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