REVISTA CEFAC
SPEECH, LANGUAGE, HEARING SCIENCES AND EDUCATION JOURNAL
Rev. CEFAC. 2016 Set-Out; 18(5):1260-1269 doi: 10.1590/1982-0216201618515915

Case reports

Dynamic soundfield system impact on the teacher's voice: case report

Impacto do sistema de campo livre dinâmico na voz do professor: estudo de caso

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Source: FAPESP (2012/08053-3 e 2012/07796-2)

Conflict of interest: non-existent

Received on: October 01, 2015
Accepted on: March 15, 2016

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ABSTRACT

The theme of this study was to evaluate the effect of the dynamic soundfield system in one period of the day, the teacher's vocal symptoms and voice quality in the classroom**.** A case relate of a teacher of 44 years who served in the role for 23 years, and taught in the same room in the morning and afternoon. The teacher used the dynamic soundfield system during one of the periods of the day for about three months. Daily evaluation was carried out of the occurrence of symptoms in the vocal tract, and their intensity before and after school; perceptual and acoustic analysis of voice before and after the observation period, and applying a self-perception questionnaire about the use of dynamic open field system, the end of the observation period. The data were analyzed descriptive and by the Wilcoxon test (p=0.05). There was a decrease in the intensity of the symptom "dryness" to the end of class, and lower incidence of vocal symptoms with the use of dynamic soundfield system, as well as improvement in perceptual and acoustic parameters of the voice after a period of observation and reporting of positives by the teacher on the use of dynamic soundfield system. In the case study, the use of dynamic soundfield system, one of the periods of the day, was effective in reducing symptoms and improvement in perceptual voice quality and acoustics.

Keywords: Amplifiers, Electronic; Signal-To-Noise Ration; Occupational Health; Educational Technology; Voice

RESUMO

Este estudo teve como tema avaliar o efeito do sistema de campo livre dinâmico, em um período do dia, nos sintomas vocais e na qualidade vocal de uma professora em sala de aula. Relato de caso clínico de uma professora de 44 anos, que atuava na função há 23 anos, e lecionava na mesma sala no período matutino e vespertino. A professora utilizou um sistema de amplificação em campo livre dinâmico durante um dos períodos do dia por aproximadamente três meses. Foi realizada avaliação diária da ocorrência dos sintomas no trato vocal, e da intensidade deles antes e após a aula; análise perceptivo-auditiva e acústica da voz antes e após o período de observação, e aplicação de um questionário de autopercepção sobre o uso do sistema de campo livre dinâmico, ao final do período de observação. Os dados foram analisados descritivamente e por meio do teste de Wilcoxon (p=0,05). Observou-se diminuição da intensidade do sintoma "secura" ao final da aula, e menor ocorrência de sintomas vocais com a utilização do sistema de campo livre dinâmico, além de melhora em parâmetros perceptivo-auditivos e acústicos da voz após o período de observação, e do relato de pontos positivos pela professora quanto ao uso de sistema de campo livre dinâmico. No caso estudado, o uso do sistema de campo livre dinâmico, em um dos períodos do dia, foi efetivo na diminuição dos sintomas e na melhora na qualidade vocal perceptivo-auditiva e acústica.

Descritores: Amplificadores Eletrônicos; Razão Sinal-Ruído; Saúde do Trabalhador; Tecnologia Educacional; Voz

INTRODUCTION

Noise is undesirable sound considered one of the most important risk factor to voice disorders in teachers[1-3].

The American National Standard Institute/Acoustical Society of America (ANSI/ASA) established, in the S12.60[4], the 35dB and 0.6 seconds as the maximum noise level and repercussion time in classroom. Yet *Associação Brasileira de Normas Técnicas (ABNT)*, in NBR 10.152, recommends 40dB as the major sound level to comfort and 50dB the higher noise level accepted to scholar environment, but there is not Brazilian standard to proper repercussion time[5].

National literature shows most classroom do not reach the standard recommended by NBR 10.152 from 1987[2,3,5,6] regarding acoustic quality, and the noise level varies from 45 up to 102dB[1-3,6] in those places. Most teachers exposed to noise have vocal complaints, and there is correlation between the increase in environment noise level and voice loudness in teachers[3,7]. The increase of loudness may be the strategy used by the teacher, who do not have the knowledge about voice health and voice set, in order to be heard and understood by the students in noise environment[8,9]. Besides noise, teachers face other improper working conditions which may lead to illness or even to definitive absence from work, and turning teachers the professionals with higher risk to voice disorders[1,10,11].

To keep the voice health of the teacher means, to school, to assure the quality of teaching and reducing costs with replacing teachers, functional readjustments, and treatment. Therefore, it is important to reduce the improper environment conditions, as the noise at school[12,13], whether by improving classroom acoustics and/or using tools that enhances teacher's voice projection in classroom, as the sound amplification system in classroom.

The sound amplification system is categorized as classroom audio distribution system, according to ASA/ANSI standard S12.60[4].

New technology of audio amplification was recently developed and it is called Dynamic SoundField System with digital sound transmitter, the Digital Modulation (DM). This system offers better sound perception and has as main features the capability to perform automatic changes in sound frequency and intensity, which provides automatically proper signal/noise (S/N) ratio and adapts the voice intensity gain level of speaker. It also eliminates possible interferences caused by Wi-Fi or Bluetooth network[14]. The system amplifies the sound equally to the entire classroom, at the same intensity, without feedback or reverberation[14], which is different from the traditional sound field amplification system that just amplifies the sound and may suffer extern factors interference as the sound source distance, noise and echo[14].

Studies about the dynamic sound field system in classroom in teachers' voice are rare[15].

Hence, the purpose of the present study was to evaluate the effect of the dynamic sound field system, in one day period, in voice symptoms and quality of a teacher in classroom.

CASE REPORT

The following case report was approved by the Ethics in Research Committee of *Faculdade de Odontologia de Bauru da Universidade de São Paulo (FOB/USP)*, protocol number 90.685/2012. The subject signed the informed consent after agreement to the research purposes, assuring the right to anonymity and the freedom to take off the consent at any moment, if necessary.

Sampling

The inclusion criteria were: teachers, age up to 45 years, teaching in the same classroom during morning and afternoon shift, in order to minimize the variables regarding acoustic and structure features. Respecting the criteria above, the sample selection was convenient, and a teacher acting in classroom of private school in *Bauru* city, countryside of São Paulo state was selected. The sample data collect was between March and June of 2013.

Therefore, the participant was female teacher, 44 years, graduated in pedagogy, acting as teacher for 23 years, and teaching the same class to the third year of Elementary School in both morning and afternoon shifts morning and afternoon.

Classroom features

The AudioTools – SPL Meter app, available to iOS system (iPad), was used to measure the intern noise level. The measurement was performed in three different places: classroom front, middle, and back, during five minutes in each position. The minimum and maximum values in classroom for both shifts were: between 55 and 82 dB in the morning, and 56 and 85 dB in the afternoon.

The classroom measures were 3,20mx8,00mx6,50m and the repercussion time (RT) was measured by the software *"Cálculo do Tempo de Reverberação (T60) de um ambiente"* [16]. The measurements were performed as office set because it was the closest option available to classroom, without acoustic treatment, and the result was 0.8 seconds of RT.

There were 18 students in the morning and 19 students in the afternoon in the third year of Elementary School which the teacher acted. There was a student with hearing impairment in the morning class, and there were any other disabled person in the afternoon class.

The classroom physical environment had blackboard and chalk in the front, and at the left side of the blackboard there was the teacher's desk facing the students. The students' desk were placed in four lines one after the other, facing the blackboard. The room had air conditioning turned on during all class period, keeping the temperature pleasant, and the lightening was proper. In addition, outside the classroom there was sport court.

Source: Phonak. Available in: <http://www.phonak.com/com/b2c/en/products/more_products/soundfield/dynamic_soundfield.html>. Accessed in 2012, March 26.

Figure 1. Digimaster 5000 - Dynamic soundfield system

Procedures

The dynamic soundfield system

The dynamic soundfield system, DigiMaster 5000 (DM) - Phonak, was installed in the classroom and had one portable speaker (available with ground or wall support), Inspiro transmitter (dynamic technology), and microphone. The teacher had contact with the DigiMaster 5000 system and used the Inspiro transmitter during three months in sequence.

Teaching periods were divided in two (morning and afternoon) looking to verify whether the dynamic soundfield system use in one period would be enough to improve the teacher's vocal performance. Two factors were considered to select which period would have the system installed in the classroom. The first was the expectation of in the morning the teacher still does not have vocal fatigue, which make the morning period best to evidence the possible benefits on the teacher's voice of the dynamic soundfield system. The second was the presence of the student with hearing impairment in the morning period, because the student required special attention and needed, many times, higher loudness and restricted position in classroom from the teacher, which would improve the student's hearing and understanding the message[17]. Therefore, the dynamic soundfield system was used in the morning period in the classroom, and during the afternoon period the class routine was the usual, without the dynamic system.

Voice and larynx symptoms self-assessment

A quiz created by the authors was used to analyze the occurrence and intensity of voice and larynx symptoms. The quiz gathered a ten centimeter visual analogue scale and blank space, above the scale, in which the teacher should sign whether the voice symptoms were present considering the present moment. If she had symptom, she should choose one or more among the symptoms listed in the superscription (roughness, breaking voice, voice with air, lack of air, weak voice, pain while talking, effort to talk, fatigue to talk, burning throat, tight throat, dry throat, sore throat, itchy throat, scratchy throat, lump in the throat, and phlegm). Teacher was guided to analyze the intensity of the perceived symptoms at the assessment moment and to mark the intensity in the analogue visual scale. The left edge of the scale was equal to none symptom intensity, and the right to the worst possible intensity.

The teacher reported the symptoms daily, at the beginning and end of each period during the three observation months. Therefore, it was possible to verify

the symptoms with (morning) and without (afternoon) the dynamic soundfield system. The scales were measured after using a rule to analyze the data.

Dynamic soundfield system self-assessment

An objective questionnaire, created by the authors, was used in order to get the teacher's opinion about the dynamic soundfield system use, and the acoustic environment of the classroom. The questionnaire had two columns, one to the use of DM system (morning period), and the other to the period without DM (afternoon period), each column had eight questions about the teacher's voice, moving in classroom, acoustic environment, attention behaviors, distraction, and discipline in classroom. The teacher should mark the more suitable response to each question, using four-point Likert scale, in which the number one was equal to never, and the number four equal to always. This questionnaire was addressed after the end of each class period during the three observation months.

Voice quality assessment

Teacher's voice quality assessment was performed using voice perceptual and acoustic analysis. Voice recording was done in two moments: before and after the observation period with an interval of three months between the two assessments. Due to the impossibility to compare the voice assessment in the periods with and without the dynamic soundfield system during the collect days, this assessment consider the entire period. Therefore, the purpose of perceptual and acoustic analysis was to investigate changes in the teacher's voice quality between starting moment (after the three months), in which she had never had used the dynamic soundfield system, and the end moment after collecting data (after the three months), in which the teacher had used the dynamic soundfield system for one period of the day.

So, the voice recording had the following tasks: sustained vowel /a/, isolated and after deep breathing, and counting numbers from one to 20, both in usual pitch and loudness. The samples were recorded in acoustic treated room, and captured by AKG microphone, C 444 PP model, placed at four centimeters from the lip at 45 degrees in front of the mouth, in computer system composed by Intel Pentium (R) 4, CPU 2.040 GHz, and 256 MB of RAM, monitor LG Flatron E7015 17" sound card Audigy II, Creative. The Sound Forge 10.0 was used to record in sampling tax of 44.100Hz, mono in 16-Bitz.

Perceptual analysis was performed using the sustained vowel /a/ and speech (counting numbers). Thus, the voice samples were randomly distributed and recorded in a DVD 52x, 7GB, audio set PCM 96KHz, 16bits, mono, transformed in waveform, without the subject and moment identification (before or after the three months period). Next, the DVD were addressed to perceptual analysis by three judges, speech pathologists, with experience above five years in voice analysis, not-authors from the study, using the GRBASI scale[18]. Also, the judges had previous training in order to calibrate the assessment. The data were sent to the judges without identification of collect period (before or after the three observation months). The judges were guided to analyze the parameter of general voice quality grade (G), roughness (R), breathiness (B), asthenia (A), strain (S), instability (I), classifying the samples according to the deviation degree, varying from zero up to three, in which zero was normal voice and three equal to high degree. Considering the subjectivity of perceptual voice analysis, it was chosen to consider the mode among the three judges to each analyzed parameter, for both sustained vowel /a/ and speech (counting numbers).

Acoustic analysis was performed based in the two sustained vowel /a/ samples. In order to do it, the samples were previously edited using the Sound Forge software 10.0®, discharging the beginning and the end of each emission, therefore the main instability pieces were eliminated. Next, the samples were analyzed using the Multi-Dimension Voice Program Advanced Model 5105, Kay Pentax ®. The analyzed parameters were: fundamental frequency (f0), jitter, shimmer, and harmonic-to-noise ratio (HNR).

Data analysis

The data regarding voice and larynx symptoms in the periods with and without the dynamic soundfield system period, and voice perceptual and acoustic analysis before and after the observation period had descriptive analysis. The Wilcoxon Test was used to compare the intensity of the symptoms reported by the teacher, before and after the three months period, taking the significance level of 5%.

RESULTS

Table 1 shows the comparison of the vocal tract symptoms frequency in the periods with and without the dynamic soundfield system use, during the three months of observation period in classroom.

It was observed significant increase of the itchy throat symptom at the end of the class, regarding the vocal tract symptoms reported by the teacher, whether using the dynamic soundfield system or not. In addition, there was significant increase of dry throat symptom at the end of the class without the system use (Table 2).

Voice perceptual analysis showed improvement in roughness degree in the sustained vowel /a/, and enhancing in the voice quality general grade, roughness, and breathiness in the counting numbers, after the three months period analyzed (Table 3).

Table 1. Occurrence of vocal tract symptoms in the teacher, regarding the use of the dynamic soundfield system, per month

Month	Observation days	With DM	Without DM
	n	n (%)	n (%)
March	3	0 (0.00%)	1 (33.30%)
April	21	7 (33.00%)	13 (61.00%)
May	21	15 (71.42%)	16 (76.19%)
June	20	7 (35.00%)	14 (70.00%)
Total	65	29 (44.61%)	44 (67.69%)

*Descriptive analysis
Subtitle: n=number; %= occurrence percentage; DM = dynamic soundfield system

Table 2. Comparison of the vocal tract symptoms intensity reported by the teacher before and after class, with and without the dynamic soundfield system.

Symptoms	With DM		p-value	Without DM		p-value
	Before Class	After Class		Before Class	After Class	
	mean (SD)	mean (SD)		mean (SD)	mean (SD)	
Itchy throat	1.80 (±3.06)	2.81 (±3.97)	0.002*	3.68 (±4.94)	7.12 (±6.59)	<0.001*
Dry throat	0.52 (±1.91)	0.89 (±2.59)	0.051	0.77 (±3.13)	2.28 (±5.16)	0.002*
Sore throat	-	-	1.000	-	0.41 (±2.39)	1.000
Scratchy throat	-	0.09 (±0.74)	1.000	-	0.12 (±0.99)	1.000

*Significant values (p≤0.05) – Wilcoxon Test
Subtitles: SD = standard deviation; DM = dynamic soundfield system

Table 3. Teacher's voice perceptual analysis before and after the observation period.

Parameters	Sustained vowel /a/		Counting numbers	
	Before	After	Before	After
	Deviation degree	Deviation degree	Deviation degree	Deviation degree
Voice quality general grade	1	1	2	1
Roughness	1	0	2	1
Breathiness	1	1	1	0
Asthenia	0	0	0	0
Strain	0	0	0	0
Instability	0	0	0	0

*Descriptive analysis
Subtitles: 0 = normal voice; 1 = slight degree; 2 = medium degree; 3 = high degree

Acoustic analysis showed decrease in f0 and jitter, and increase in shimmer and HNR after the analyzed period (Table 4).

Figure 2 presents that using the dynamic soundfield system the teacher reported decrease in the frequency of repetition information to students, decrease in the frequency of fatigue to talk, and vocal effort. The teacher also reported enhancing the frequency of students being silent while she was speaking.

Table 4. Teacher's voice acoustic assessment before and after the observation period

Acoustic parameters	Before	After
f0	184.637Hz	183.147Hz
Jitter	2.603%	2.199%
Shimmer	1.905%	2.517%
HNR	0.086	0.091

Descriptive analysis
Subtitle: f0 = fundamental frequency; HNR = harmonic-to-noise ratio

Questions	Without DM	With DM
1. My classroom is noisy.	2	2
2. I need to repeat information/instructions	3	2
3. I feel tired while talking	3	2
4. I make effort to talk	3	1
5. I can move easily in classroom	4	4
6. The students are indiscipline in classroom	2	2
7. The students are quiet while I am speaking	3	4
8. The students pay attention to my explanation in classroom	3	3

Subtitle: DM = Dynamic soundfield system; 1 = never; 2 = sometimes; 3 = often; 4 = always

Figure 2. Questionnaire results about the teacher experience using the dynamic soundfield system

DISCUSSION

Studies point out the noise level found in classroom is beyond the recommended by NBR 10.152 from 1987[5]. The classroom noise affects the voice health, contributing to occupational dysphonia[1-3,6]. Therefore, the current study presents preliminary data seeking to incite the discussion about the technology yet little studied that is the dynamic soundfield system, which provides better signal/noise ratio in classroom, and help the students' comprehension of the teacher's voice. In addition, it also decrease the vocal effort, it benefits the teacher's voice health. International literature also highlights the possibility to use at the same time the dynamic soundfield system and therapy during the intervention process and dysphonia treatment in teachers[19].

Regarding the vocal tract symptoms monthly frequency analyzed daily, it was observed higher occurrence of voice symptoms in the period without the dynamic soundfield system use. During 29 days (44.61% from 65 days) with the system use in classroom, the teacher reported the occurrence of some vocal tract symptom, and without the system the amount of days in which the same teacher had voice symptoms were 44 (67.69% from 65 days) (Table 1). These results show the frequency of voice symptoms using the dynamic soundfield system is lower, suggesting the dynamic sound field system was effective to decrease the vocal tract symptoms. But, it is not possible to affirm the dynamic soundfield system use had decreased the voice and larynx symptoms due to the design study of the research. The evaluation of the period without the system (afternoon period) was performed after four hours of the classes given in the morning period, which may had interfered in the teacher voice condition, due to natural voice wear from the voice demand.

A study[15] investigated the dynamic soundfield system benefits to 18 teachers of Elementary School

that used the DigiMaster 5000 from Phonak during two months period. Before the system use, 30-minute training was offered guiding the teachers to use the equipment, and after the two months a questionnaires was addressed to the teachers with nine questions about the changes while using the system, regarding the students, themselves, and the classroom. To most teachers, the students performance improved, the distraction behavior decreased, and cooperation in the classroom increased; also they reported lower fatigue and vocal effort, caused by the lower need to repeat information. Most teachers felt the classroom less noisy and evaluated the system as effective to use in classroom. The study concluded the equipment to be effective to both students and teachers, and to improve the classroom acoustic[15], reinforcing the system benefits to teachers' vocal health, and corroborating to the results of the present study. Furthermore, these findings are similar to the reported by the teacher at the current research (Figure 2), because she reported decrease in the need to repeat oral instructions, fatigue and effort to talk while using the dynamic soundfield system.

Regarding the intensity of the vocal tract symptoms reported daily by the teacher for the three months period, it was observed the significant improve of the mean intensity of itchy throat in both periods, with and without the dynamic soundfield system use, and the increase in dry throat symptom in the period without the system use (Table 2). It is important to stand out just the four reported symptoms by the teacher in daily symptoms intensity evaluation were analyzed. These data show the itchy throat symptom worsened, regardless the dynamic sound field use, and there was no relation of the symptom worsening with the system use. However, it may be related to environment factors which the teacher is exposed to, for instance dust, noise, air conditioning, and inefficient hydration, and vocal misuse[20,21].

The major frequency of dry throat in the period which the teacher did not use the dynamic soundfield system corroborates to other studies showing the dry throat symptom is the most reported symptom by Brazilian teachers in recent researches[22,23], which relate the unfavorable work conditions, as background noise, the acoustic improper set of classroom, strain while talking, vocal misuse, and lack of hydration[22]. Furthermore, other studies show direct relation between the increase in mean loudness and the noise in classroom[3,7]. Probably the lower occurrence of dry throat symptom related to the dynamic soundfield system may happened due the enhance of acoustic conditions, and the reduction of vocal misuse, because the dynamic soundfield system enable sound amplification and even distribution to entire classroom, in the same intensity to all students, without repercussion or reverberation[15], therefore it does not require the increase of teacher's voice loudness to reach all students, common strategy in teachers[7,8]. These data are reinforced by the acoustic classroom features, where the noise level varied from 55 up to 85dB, surpassing the recommended level by NBR 10.152 from 1987[5]. Other researches measuring the noise level of classroom also found levels surpassing the recommendation[2,3,6]. But, it also may be the dry throat symptom increased in the afternoon period because it is the second period of the day, and the vocal load is intense in classroom, which may lead to natural voice wear, due to the first four hours of classes in the morning period.

Voice perceptual analysis pointed out the improvement in roughness degree in the sustained vowel, and the improvement in voice quality general grade, roughness and breathiness in the counting number, after the dynamic soundfield system use (Table 3). Roughness is a noisy voice quality that indicates vocal folds vibration irregularity, regardless the noise vibration frequency because it contemplates both hoarseness and harshness[24,25]. Breathiness is the audible presence of air in voice[24]. The improvement of those parameters together may mean the improvement in glottal closure regularity, and in contact coefficient, decreasing the noise and improving voice quality in general, leading to the improvement in voice quality general grade, which enhanced the voice misuse and caused more control of signal/noise ratio in classroom, capable of improving the teacher's voice quality.

Acoustic analysis showed decrease in fundamental frequency and jitter, and increase in shimmer and harmonic-to-noise ratio after the dynamic soundfield system use (Table 4). Literature quotes the association between the increase of sound pressure level and the fundamental frequency[26]. The decrease of loudness enable by the dynamic soundfield system use, that automatically adjusts the frequency and intensity of sound in order to reach all the students equally[14], may have facilitated the teacher communication, decreasing the fundamental frequency, because the vocal effort may have decreased, and the fundamental frequency lower indicates the decrease of strain and muscle overload[7,24,25]. Thus, a study analyzing the perception

of 12 teachers, mean time experience of 13 years in classroom, regarding the perceived changes between the teaching periods with and without the dynamic soundfield system use, showed 92% of teachers reporting the decrease of vocal strain the major benefit of the dynamic soundfield system[27].

Jitter is the cycle-by-cycle frequency perturbation, indicating the differences between one glottis vibration cycle and the next one[28]. The decrease in jitter may point out more regularity in vocal fold mucosa vibration, which match the decrease of noise in vocal quality[25,28,29]. The increase in harmonic-to-noise ratio corresponds to the amount of harmonic against the amount of noise in voice, which means the overall decrease of noise in voice, including amplitude variations and frequency, turbulence noise, sub-harmonic components, and voice breakdowns[28], corroborates to the other findings of acoustic analysis. Therefore, it is observed the acoustic analysis reinforces the results of perceptual analysis. The results revealed improvement in voice emission after the dynamic soundfield system use. Still, the shimmer measure is the amplitude perturbation cycle-by-cycle, and it shows how the amplitude of a cycle if different from the next one[28]. The increase of shimmer may indicates worsening of vocal folds contact coefficient[25,28,29], and may be connected to teacher's vocal and muscle fatigue.

A study analyzed the efficacy of two voice treatment programs in 44 dysphonic teachers, divided randomly in three groups, 15 teachers using the sound field system ChatterVox, 15 teacher in vocal hygiene program, and 14 teachers in control group without treatment. Before and after six weeks period of intervention, the teachers were assessed in acoustic analysis and addressed the Voice Handicap Index (VHI), a self-assessment questionnaire of the dysphonia severity, and one scale of voice and acoustic changes analysis after the treatment. The results showed only the group using amplification had the lower scores in VHI, decrease in self-perception of general grade of dysphonia, and decrease in acoustic measures jitter and shimmer. The questionnaire investigating the perceived benefits after treatment addressed showed significant difference between the group using sound amplification and the vocal hygiene guidance, and the group with sound amplification reported more intelligibility of singing and speaking voices, easier to produce voice, and were more adapted to the treatment schedule. The results corroborate with the acoustic findings of the current research, and reinforce the possibility of sound amplification use as alternative source to dysphonia treatment in teachers[19].

In general, voice perceptual and acoustic analysis, the frequency and intensity of voice symptoms reinforces the dynamic soundfield system use contributing to teachers' voice health[12,13,19].

The limitations of the current study were the number of participants, the convenience sample, because the teacher was indicated by the school as the only teacher with classes in both periods in the same classroom, and the analysis of a single subject with and without the dynamic sound field system, which happened after four hours of teaching in the morning period.

The results of the present study should be considered as preliminary, but seek to incite more researches that analyzes the benefits of the dynamic soundfield system in teachers voice in short and long term, using classrooms with different acoustic sets, larger sample of teachers, diverse scholar background, teaching network, and time using the dynamic soundfield system. These measures, in future studies, may be important research field to new studies with the dynamic soundfield system in scholar environment.

The evidence, despite preliminary, are the first steps to future researches in this field, aiming in the future to contribute with scientific evidence to public politic planning regarding the teachers voice in scholar environment.

CONCLUSION

Hence this case report studying the dynamic soundfield system in classroom in teacher's voice and vocal health, it was possible to conclude the use of dynamic soundfield system in one period of the day was effective to improve and decrease the dry throat symptom, fatigue while talking, and vocal effort, as well as the improvement on voice quality showed by the decrease in roughness and breathiness, besides the enhancing in f0, *jitter* and HNR acoustic measures.

ACKNOWLEDGEMENT

We acknowledge FAPESP for the financial support to this research (Process number 2012/08053-3, and 2012/07796-2).

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