

# Intervention via teleducation about vocal mutation and vocal habits

## Intervenção fonoaudiológica por meio da teleducação sobre a muda vocal e hábitos vocais

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### ABSTRACT

**Purpose:** To develop and to analyze the effects of a training program about voice mutation and healthy vocal habits using the model of education in health from the Young Doctor Project. **Methods:** Eleven students enrolled in the 7th and 8th years of a public school, divided in two groups, completed the program: Young Doctors group, composed by four students, who were trained through presential and virtual activities, and Students group, composed by seven students, who received knowledge transmitted by the Young Doctors. A virtual learning environment was developed, in a weblog format, to train the Young Doctors. All the participants answered a questionnaire before and after training. **Results:** Young Doctors were multipliers of the knowledge acquired in the training course to other students in the school. There was an increase in knowledge between the pre-training and post-training periods for all participants, in both groups. **Conclusion:** The program was developed and contributed with the largest interaction between the university and the community. The students' knowledge about the importance of knowing about the voice changes that happen during adolescence and about healthy vocal habits increased through training. The transmission of this knowledge represents a potential for dysphonia prevention and reduction of difficulties stemming from these changes.

**Keywords:** Voice; Adolescent; Telemedicine; Education in health; Distance learning

### RESUMO

**Objetivo:** Desenvolver e analisar os efeitos da aplicação de um programa de capacitação sobre muda vocal e hábitos vocais saudáveis, utilizando o modelo de ensino em saúde do Projeto Jovem Doutor. **Métodos:** Completaram o programa 11 alunos, matriculados entre o 7º e o 8º ano do ensino fundamental de uma escola pública, divididos em dois grupos: grupo Jovens Doutores, composto por quatro alunos, que foram capacitados por meio de atividades presenciais e virtuais, e grupo Alunos, composto por sete alunos, que receberam o conhecimento transmitido pelos Jovens Doutores. Foi desenvolvido um ambiente virtual de aprendizagem, em formato de *weblog*, para a capacitação dos Jovens Doutores. Todos os participantes responderam a um questionário antes e após a capacitação. **Resultados:** Os Jovens Doutores foram multiplicadores dos conhecimentos adquiridos no curso de capacitação para outros alunos da escola. Houve aumento no nível de conhecimento entre os períodos pré-capacitação e pós-capacitação, para todos os participantes, tanto do grupo Jovens Doutores, como do grupo Alunos. **Conclusão:** O programa foi desenvolvido e contribuiu com a maior interação entre a universidade e a comunidade. Houve aumento do conhecimento adquirido pelos estudantes, por meio da capacitação, sobre a importância de conhecerem as mudanças que ocorrem na voz, no período da adolescência, e sobre os hábitos vocais saudáveis. A transmissão desses conhecimentos representa um potencial para a prevenção de disfonias e redução das dificuldades decorrentes dessas mudanças.

**Palavras-chave:** Voz; Adolescente; Telemedicina; Educação em saúde; Educação à distância

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## INTRODUCTION

In face of the importance of prevention and promotion of vocal health, teleducation resources have been used to potentialize the outreach of information and increase the interest, by the public, in the topics discussed, using technological and telecommunication resources that transmit data, sound, and image<sup>(1)</sup>.

Some projects about education in vocal health involving interactive resources have been developed. The expansion of knowledge about voice was observed after the use of a webpage created for teenagers, in this age group<sup>(2)</sup>, in one of the projects. The same happened with junior high and high school teachers via a distance learning course about vocal health and expressiveness<sup>(3)</sup>. Another interactive resource used was the CDROM *Homem Virtual Voz* (Virtual Man Voice), Volume 1, released by Speech and Language Pathology students, to instruct about anatomophysiology of the voice and speech, and about singing voice<sup>(4)</sup>. A virtual learning environment (ambiente virtual de aprendizagem, AVA<sup>(5)</sup>, in Portuguese) was developed with the intention to prepare undergraduate students of Speech and Language Pathology to carry out a perceptive-auditory assessment. All these studies demonstrated the increase in the number of people that use interactive resources.

The Young Doctor Project also intends to promote health through different strategies that involve telehealth, so that a productive chain of knowledge about different areas of health can be built. Thus, this is a project that involves multiprofessional activities, applied directly to junior high/high school students, guided by faculty members, graduate and undergraduate students aiming to modify behaviors harmful to health. Junior high/high school students are called Young Doctors after receiving training through presential classes, virtual environments, and workshops, when they can finally be multipliers of the knowledge received to the community they belong<sup>(6,7)</sup>.

Specifically in the voice area, the Young Doctor Project developed two versions about vocal health, targeting 6th - 9th graders of a private school<sup>(8)</sup> and high school students of a public school<sup>(9)</sup>, resulting in 31 qualified students transmitting knowledge to 1750 people in their community. A Cybertutor was used in both versions as an interactive and technological resource, structured in four units, corresponding to anatomy and voice physiology, voice care, dysphonias, and aspects to help improve communication.

Currently, weblogs have been highlighted as possibilities for content transmission online, for the ludic, informative perspective, possibility for instant publications and idea exchange. They have become more popular since they are easy to use<sup>(10)</sup>. Moreover, the visitor can leave comments, allowing the author to communicate with who wrote it, increasing interaction. Weblogs allow for short texts and require formal language<sup>(11)</sup>.

These technological resources and investment in health promotion must consider a very important subject that is not very explored: vocal mutation and healthy vocal habits.

Puberty is a natural phenomenon that usually takes place during adolescence. Due to processes of hormonal transformations, changes are evident in morphological and physiological aspects of the voice, stemming from the development and adaptations of the larynx that cause a period of natural unbalance, called vocal mutation<sup>(12)</sup>. Vocal mutation is more evident in boys<sup>(13)</sup>, aged between 13 and 15 years; in girls, the process is more subtle and happens between the ages of 12 and 14 years<sup>(14)</sup>. In some

individuals, the vocal mutation can be delayed, extended, or be incomplete but in a natural way, vocal mutation allows for a new voice and this represents a new personal image. It is a stage that needs to be lived and accepted as maturing completely, in which hormonal levels are altered and the larynx has rapid growth. Consequently, the voice suffers alterations in a short amount of time<sup>(15)</sup>.

Vocal habits in adolescence also need special attention, due to bad habits often acquired. A study with choristers aged between 9 and 18 years, showed that 40% of the participants have presented hoarseness, 15% had speech-language therapy sessions, and only 20% did voice care<sup>(16)</sup>.

Another study indicated that regarding vocal production and care, and the use of the voice as an instrument of communication, adolescents aged 10 to 19 years, predominantly 18 and 19 year-olds, both genders, accessed a site about voice during the training process. Among these, 62% stated that, before the training process, the voice is a sound and a mechanical product of the body and, after the process, described the voice as an instrument of communication; 59% showed pleasant sensations during oral communication; the boys mentioned negative aspects, related to vocal instability. In spite of these findings, 75% related positive aspects about their voices<sup>(2)</sup>.

Therefore, providing adolescents with knowledge about the natural process of vocal development, including the stage of vocal mutation, as well as knowledge about healthy vocal habits, represents a potential to provide a healthy living in this stage of life. Moreover, adolescents can contribute for the prevention of vocal problems of the community they live in, including their school. For this reason, the objective of this study was to develop and implement a training program about vocal mutation and healthy vocal habits based on the Young Doctor Project, in addition to analyzing the immediate effects of its implementations.

## METHODS

The project was approved by the Human Research Ethics Committee of the institution under no. 18248813.0.0000.5417 of the Certificate of Presentation for Ethical Consideration (CAAE) and it was done in a public school in a town in the interior of the state of São Paulo, after consent and signature of the Term of Consent by the principal, as well as the Free and Informed Consent Form (TFC) by the participating students and their parents/guardians.

A lecture was presented to three classes of the 7th and 8th years, selected by the principal, with the help of didactic material in audiovisual projection, explaining about the proposal of the Young Doctor Project and a short introduction about vocal mutation and healthy vocal habits.

The exclusion criteria adopted was the students being between 13 and 15 years and not having been provided any knowledge in other activities in the school about the topic in the study. The following groups were composed, based on the students' interests in participating as a Young Doctor or as Student, with their parents' consent:

Young Doctors Group - students that would be trained about vocal mutation and healthy vocal habits.

Students Group - students that would receive content about these same topics, by the Young Doctors.

Following the pre-established inclusion and selection criteria, 11 students participated in the project, nine girls and two boys, aged 13 to 15 years, average age of 14 years, four in the Young Doctor Group and seven in the Students Group.

## Development and Implementation of the training program

### 1st Stage - presential activity

The presential activities of the training program were done by two weekly meetings with the researcher, on Thursdays afternoon, in the shift opposite to their classes, averaging two hours each. Expository classes were presented, aiming to capacitate the Young Doctors about adolescent vocal mutation and healthy vocal habits.

During these classes, synthetic texts with several illustrations were elaborated and used, in addition to videos, presented in Power Point. The topics selected to be covered were chosen according to the scientific literature available about the topic (Chart 1).

### 2nd Stage - Virtual Learning Environment (AVA)

In the distance learning activity, educational content was presented aiming to complement the material shown in presential activities via AVA, in the weblog format. Wordpress, an online facilitating platform for weblog building, was used, enabling its use and free updates. We emphasize that the choice of using weblogs was due to the possibility of exposing content in diversified formats such as texts and videos, in addition to allowing interactivity between administrator and users. Weblogs allow the addition of posts in inverse chronological order and have resources such as comment sections, allowing for bigger interaction<sup>(17)</sup>.

The primary sources to obtain information were books, articles in national and international journals available online, and information available on the internet, allowing us to select the content, organized in a simple manner for better understanding. In addition to the written content, we made links

of existing materials available about the topics, and static and dynamic images of the Virtual Man Project (Projeto Homem Virtual, in Portuguese). Thus, the weblog was divided in seven topics: Larynx, Vocal Fold, Voice, Voice Production, Voice in Adolescence, Vocal Care, and Bibliography.

Using AVA, students guided their own learning, being able to access the content every day, in the afternoon, in the computer room of their school for four weeks.

To access AVA, each Young Doctor received a sheet from the researcher with the electronic address, user name, and password. Initially, the researcher set up a time, so she could explain step by step what should be done for students to access the virtual environment.

After the first presential class, access to the weblog was granted and the members of the Young Doctors Group had two weeks to study the content in the weblog - vocal mutation; the same happened after the second class, which was about healthy vocal habits<sup>(18)</sup>. The school allowed the use of the computer room every day, in the shift opposite to classes, so students could access the weblog for study time. The computers could be used for as long as needed during that period.

### Multiplication of knowledge

After the training period, the students then called Young Doctors, had the chance to multiply the knowledge acquired with other students interested in it.

The Young Doctors prepared, under the researcher's supervision, a class about the content, using Power Point with simple text, images, and videos. The topics were the same as those from the Young Doctors training program, that is, vocal mutation and healthy vocal habits. This stage of preparing the material was developed in two meetings, in the shift opposite to their classes.

The class presented by the Young Doctors to the Students Group happened during regular class time and took one hour. All Young Doctors trained in the previous stage participated as presenters. The students were given the opportunity to ask questions to the Young Doctors. At the end of the process, students from the Young Doctors Group received a certificate for their participation.

**Chart 1.** Topics chosen for the two presential classes

CLASS 1	CLASS 2
Vocal Mutation	Healthy Vocal Habits
<ul style="list-style-type: none"> <li>&gt; What is larynx?</li> <li>&gt; What are the structures of the larynx</li> <li>&gt; Respiratory Function</li> <li>&gt; Deglutitory Function</li> <li>&gt; Phonatory Function</li> <li>&gt; What is a vocal fold?</li> <li>&gt; How does the vocal fold move?</li> <li>&gt; What is voice?</li> <li>&gt; How is voice produced?</li> <li>&gt; Adolescent voice</li> <li>&gt; What is the difference between female and male larynx?</li> <li>&gt; Which mutations happen to the voice?</li> </ul>	<ul style="list-style-type: none"> <li>&gt; How can you look after your voice?</li> <li>&gt; Screaming or Talking loudly</li> <li>&gt; Competing with sounds</li> <li>&gt; TV and Radio volume control</li> <li>&gt; Cold and its relationship with vocal hygiene</li> <li>&gt; Vocal hygiene and Nutrition</li> <li>&gt; Vocal hygiene and Hydration</li> <li>&gt; Use of Medication, Alcohol, Cigarettes, and other Drugs</li> <li>&gt; Appointment with an Otorhinolaryngologist and Speech-Language Pathologist</li> </ul>

## Evaluation of the training program

Intending to assess the effects of the training program for Young Doctors and the effects of the classes about knowledge multiplication, a questionnaire containing five figures representing healthy vocal habits was created, and the students had to indicate which habit was good or bad for the voice and why. For each habit evaluated, 0.5 or 1.0 point was given, according to correct answers and/or explanations. The remaining items could obtain 0.25, 0.5 or 1.0. Questions could total 0.0 to 10.0, 10.0 being the best result. Questions were elaborated based on topics covered during training: voice production, vocal development, and vocal habits (Annex A).

The questionnaire applied by the researcher was the same for both groups. The application happened in the following moments: a) to Young Doctors, before and after the training program; b) to Students, before and after the class presented by the Young Doctors. The time estimated for participants to answer the questionnaire was two hours maximum.

The detailed stages of the study are illustrated in Figure 1.

## Analysis of the results

The results of the pre-training and post-training questionnaires were compared through the Wilcoxon test ( $p < 0.05$ ), as well as the results from the questionnaires answered by Students of the

class chosen, before and after being exposed to the knowledge transmitted by Young Doctors.

## RESULTS

Regarding the first stage of Young Doctors training, only three students showed for the first class about voice mutation. For this reason, another meeting was scheduled, in which more participants attended. Consequently, the class was presented again for everyone and four students became our future Young Doctors. The second topic, presented as a expository dialogue class, covered healthy voice habits. This time, the four Young Doctors attended and the topics were: vocal abuse, water intake, nutrition, medicines, drugs, and cigarettes.

In the distance learning stage, we verified that they accessed the weblog on the scheduled days, as a coordinator supervised them in the computer room.

According to the comparative analysis of results of the pre-training and post-training questionnaires, Young Doctors and Students demonstrated better performance after training when compared to pre-training. The Wilcoxon test indicated a significative increase in the score of all participants and in the Students group, separately (Table 1).

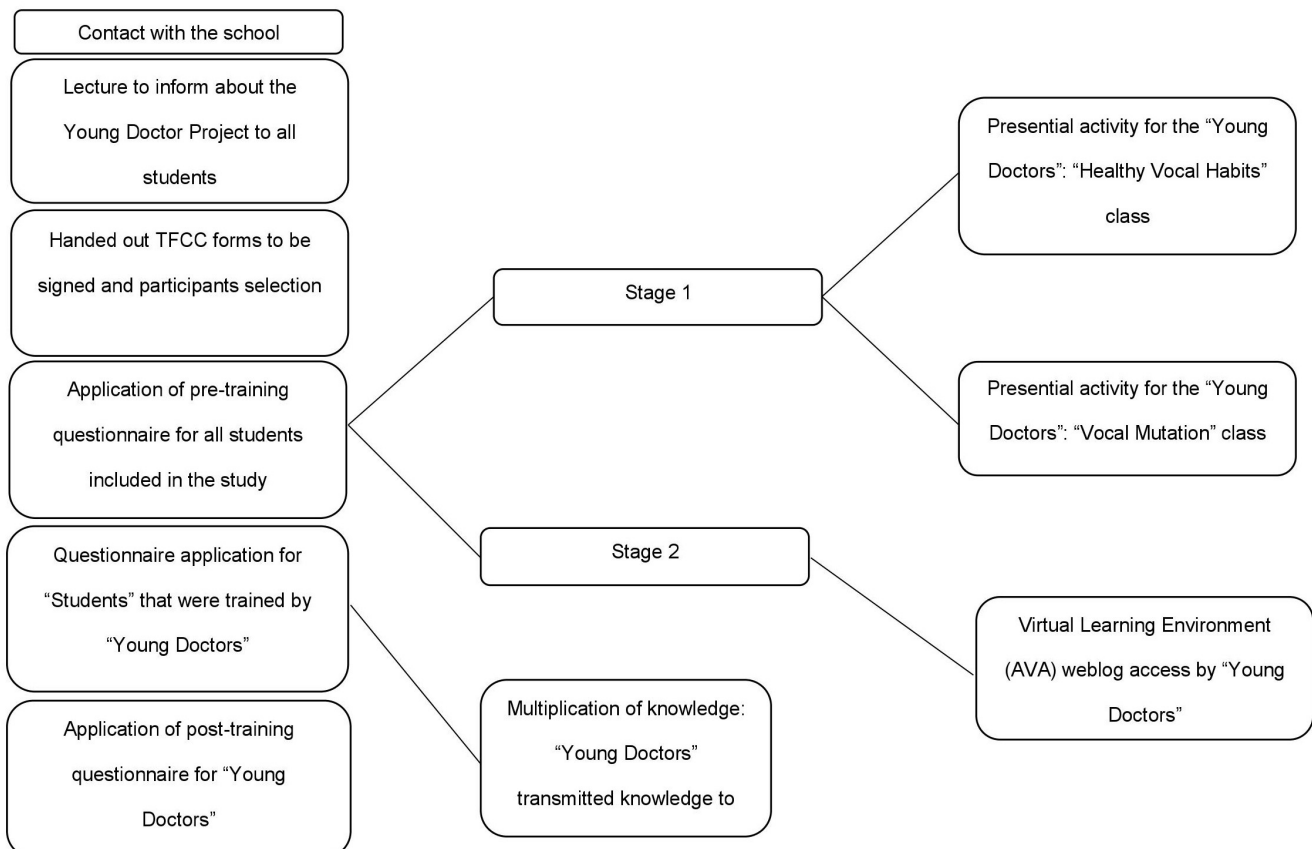


Figure 1. Stages of speech-language intervention

**Table 1.** Comparison of results from the pre- and post-training questionnaires for the Young Doctors Group, Students Group, and for both groups together

	Young Doctors Group (n = 4)		Students Group (n = 7)		Young Doctors Group + Students Group (n = 11)	
	Pre	Post	Pre	Post	Pre	Post
Average	5.50	7.43	7.28	8.21	6.63	7.93
dp	0.93	0.37	1.43	0.80	1.52	0.76
p	0.068		0.027*		0.005*	

\*Statistically significant values ( $p < 0.05$ ) - Wilcoxon Test

Subtitle: n = number of subjects; sd = standard deviation

## DISCUSSION

The Young Doctor dynamics demonstrates to be important for the promotion of more wholesome health-related behaviors and for the construction of methodologies and tools for education in health, so that they can be reused in series of such actions. Thus, the construction of material directed to the young population about vocal mutation and healthy vocal habits, in addition to the increase of knowledge after the development of all the dynamics proposed was observed.

Concerning the direct participation of students, we can highlight that even though during the initial lecture many students showed interest in the subject, asking questions and showing willingness to become Young Doctors, only 11 students completed all the proposed activities. The need for the students to come to the school in the shift opposite to theirs explains the low adhesion. Moreover, despite our providing the Term of Free and Clarified Consent form with all due information, strategies of awareness towards the families so that parents motivate their children to participate were not used. We suggest that in other editions of the program, an awareness program be done for the parents, regarding the benefits for the students themselves and all the community.

Recently, another study about obstructive sleep apnea had similar results regarding participation, with a total of five students using the same principles of Young Doctor Project, at the same school<sup>(19)</sup>. In another version of the project, this time about voice and hearing, students from several schools were invited, allowing a larger participation, resulting in 31 participants. The study about voice was also developed in two public schools and had a total of 14 students participating. The number of participants per school was small as seen in presentations by other editions of the project, as well as in the present study. A more expressive number, 41 students of a private school, was seen in a Young Doctor Project about cleft lip and palate<sup>(20)</sup>; possibly, the school structure and the incentive for student participation, as well as the topic, contributed to a larger number of participants. In contrast, despite the low number of participants in the present study, all those involved seemed motivated to do the activities, not only to learn more about vocal mutation and healthy vocal habits but also to transmit knowledge to their peers, family members, and people in their community.

One of the principles of the Young Doctor Project is the use interactive and attractive materials. Thus, a weblog about voice mutation and healthy vocal habits was created. Weblog is one of the technologies that promote distance learning; other

studies made use of this instrument in different topics, as it is the case of the fissure and hearing weblog, created so health professionals can be informed about aspects related to cleft lip and palate and hearing, using Wordpress<sup>(21,22)</sup>.

Originally, the project uses Cybertutor<sup>(9,19,20,22-24)</sup>, but in this version of the project, we opted for the weblog due to the benefit of autonomy to researchers of different institutions, offering resources similar to the Cybertutor such as inserting information (posts) among texts, static images, videos, audios and links, and a comments section in which visitors make considerations, favoring interaction between owner-visitor and visitor-visitor<sup>(25,26)</sup>. The weblog has been used for the search of information about health on the internet, besides sharing feelings and experiences in situations of illness, allowing patients to feel safer and more confident during the treatment. Literature showed little use of weblogs for formation in health, which is the focus of this study<sup>(26)</sup>. Other authors also highlighted and motivated the use of weblogs as a way to facilitate the transmission of information<sup>(10,11,27-29)</sup>. Knowing that the learning process is more than reproduction of contents<sup>(26)</sup>, the present study was composed by other pedagogical strategies, which stimulated the active role of Young Doctors in the construction of new knowledge about vocal mutation and healthy vocal habits.

The use of interactive resources during the training of Young Doctors and their enthusiasm during the activities demonstrated that the use of attractive materials contributes to the project's success.

In the evaluation about the knowledge of the Young Doctor Group, which took place before and after training, the number of correct answers was verified, configuring a difference of 2 points in the average, even though the statistic test did not indicate significance, probably due to the small number of participants. When the pre-training and post-training moments were compared, for all 11 students, including Young Doctors and Students, the increase in the number of correct answers was significative. In the version of the Young Doctor Project about cleft lip and palate, developed by 41 students<sup>(19)</sup>, a significative increase in the number of correct answers was verified in the pre- and post-training also.

In a study about the speech-language intervention proposed to adolescents about voice care through the creation of a site<sup>(2)</sup>, the increase of knowledge by the young population that accessed the educational site about the topic was observed. Even though the study mentioned does not present the Young Doctor Project format -- providing the multiplication of knowledge to the community through training of junior high and high school students, it evidenced that distance learning can promote

education in health for this population, specifically about vocal health. The present study, in addition to discussing voice care, also presented aspects about the process of vocal mutation as something natural, due to the fact that adolescents have colleagues who are going through or will be going through this process. The increase of knowledge verified in the Student Group, who received knowledge from the Young Doctors, was 1 point in the average of the questionnaire, with statistical significance, showing this method was also efficient in reaching people not involved in the project. One of the objectives of applying the Young Doctor Project methodology is to prepare young people to multiply the knowledge that they were trained on, to the community. In the present application of the project, we opted to measure, systematically, the learning provided by the trained Young Doctors to the other Students at the school. This type of evaluation was unprecedented in the Young Doctor Project in Speech and Language Pathology topics, making it impossible to be compared.

We hope that with this work, more studies can be promoted inside the Young Doctor Project, aiming to disseminate knowledge, benefiting the promotion of health.

## CONCLUSION

The training program about vocal mutation and healthy vocal habits, based on the Young Doctor Project dynamics, was developed, applied, and analyzed. Despite the number of participants, a significative increase in knowledge, compared to the period before and after the training of two groups studied was observed.

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**Annex A.** Questionnaire of evaluation pre-training and post-training for the participants**QUESTIONÁRIO****1. Leia atentamente as afirmações abaixo sobre a voz e assinale verdadeiro (V) ou falso (F) para cada uma:**

- A voz é o som produzido pela vibração das pregas vocais na laringe, pelo ar vindo dos pulmões.  
 O desenvolvimento da voz acompanha e representa o desenvolvimento do indivíduo, tanto do ponto de vista físico, como psicológico.

**2. Leia atentamente a afirmação abaixo:**

“A voz é produzida na laringe, que fica no pescoço. O som depende do controle cerebral, que coloca em vibração as pregas vocais. O combustível dessa vibração é o ar que sai dos pulmões, o que faz produzir a voz humana, que se transforma nos sons da fala pelos movimentos articulatorios, como língua e lábios”.

Abaixo, foram selecionadas algumas afirmações sobre a produção da voz; assinale verdadeiro (V) ou falso (F):

- A voz é uma das formas mais utilizadas para manifestar suas ideias, sentimentos e identidade.  
 Ela identifica a idade, gênero e o tipo físico. É também um dos meios mais fortes de manifestar a personalidade e estados emocionais.  
 A voz é um componente importante na comunicação, uma vez que transmite palavras, mensagens e sentimentos.  
 A produção da voz é realizada com a participação de uma série de estruturas que começa na laringe, situada no pescoço, e termina na cavidade da boca e do nariz.

**3. Leia atentamente a afirmação abaixo:**

“A Organização Mundial de Saúde (OMS) define a adolescência como a fase dos 10 aos 20 anos de idade. Essa definição é baseada no aparecimento das características sexuais, pelo desenvolvimento de processos psicológicos e de padrões de identificação que evoluem da fase infantil para a adulta, e pela transição de um estado de dependência para outro de relativa autonomia”.

Diante da afirmação acima, assinale verdadeiro (V) ou falso (F) para as alternativas:

- Na adolescência, ocorre um crescimento evidente da laringe, acompanhando o crescimento corporal, mais acentuado nos meninos.  
 A voz torna-se levemente rouca e instável, com várias flutuações, mas tendendo aos sons agudos.

**4. Assinale verdadeiro (V) ou falso (F) para a alternativa abaixo sobre hábitos vocais saudáveis:**

- Dormir adequadamente, ter boa alimentação e fazer uso de líquidos gelados constantemente.

**5. Isso é bom ou ruim para a voz?**

Gritar

Bom  Ruim  Por quê?

Falar em ambiente ruidoso

Bom  Ruim  Por quê?

Beber água

Bom  Ruim  Por quê?

Tossir

Bom  Ruim  Por quê?

Comer maçã

Bom  Ruim  Por quê?

**6. Assinale verdadeiro (V) ou falso (F) para as afirmações abaixo:**

- A voz existe desde que nós nascemos até ficarmos bem velhinhos.  
 A voz conta quem você é e como você está.  
 Beber muita água não hidrata todo nosso corpo e faz as pregas vocais funcionarem melhor.  
 Quando você sentir um tipo de catarro na garganta procure tirá-lo rapidamente.

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