

**Occupational safety and health aspects of voice problems:  
Challenges for academics**

By

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A thesis submitted to the School of Pharmacy in partial fulfillment of the requirements for  
the degree of  
Bachelor of Pharmacy (Hons.)

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## **Declaration**

It is hereby declared that

1. The thesis submitted is my own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I have acknowledged all main sources of help.

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## Approval

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## **Ethics Statement**

The study does not involve any human or animal trial.

## **Abstract**

Prevalence of vocal problems during teaching career is one of the major concerns for Academics. Teachers frequently use a high-intensity voice in noisy classrooms for lengthy period without proper breaks. As a result, academician's face different symptoms of voice disorders such as voice quality changes, voice breaks, voice projection difficulty, and throat discomfort. Most of these problems are preventable and prevention programs need to be developed and evaluated. The purpose is to review the main risk factors, identify importance of training programs, implementation of effective diagnosis process and treatment strategies of voice disorders. Teachers who suffer from voice disorders have a negative impact on their occupation along with complex health problems. So it is very important to ensure the occupational safety for academicians in order to reduce their rate of prevalence.

**Keywords:** Risk Factors, Treatment Strategy, Academicians, Diagnosis, Intervention, Prevalence

## **Dedication**

*Dedicated to my Parents*

## **Acknowledgement**

The Almighty Allah deserves all of my adoration, and I would want to express my gratitude to him for providing me with the patience and strength that were necessary to complete this project.

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## **List of Acronyms**

|       |  |
|-------|--|
| PVU   | Professional Voice Users   |
| ASHA  | American Speech-Language-Hearing Association                         |
| NIDCD | The National Institute on Deafness and Other Communication Disorders |
| FVD   | Functional Voice Disorders   |
| PVD   | Psychogenic Voice Disorders  |
| MTVD  | Primary Muscle Tension Voice Disorders                               |
| SMTVD | Secondary Muscle Tension Voice Disorders                             |
| VD    | Voice Disorder   |
| NVD   | Non Voice Disorder   |
| WHO   | World Health Organization  |
| ICIDH | International Classification of Impairment, Disability, and Handicap |
| GERD  | Gastroesophageal Reflux Disease                                      |
| OSH   | Occupational Safety and Health                                       |
| VHI   | Voice Handicap Index   |

# Chapter 1

## Introduction

Voice disorder is defined as the irregular production or disappearance of voice quality, tone, strength, frequency, and length that is unsuitable for in relation to the single's age or gender. Voice issues hamper one's capacity to communicate properly. Laryngitis, paralyzed vocal chords, and a nerve issue that causes the vocal cords to convulse are examples of these illnesses(Roy, Merrill, Thibeault, Gray, et al., 2004). The term "Professional Voice Users" (PVU) refers to those whose jobs require them to use their voices. Professional voice users include musicians, performers, customer service representatives, attendants, merchants, and professors, to name a few. The PVU are categorized based on how professional demands and vocal load interact(de Medeiros et al., 2008). Voice disorder as the deformation of the voice, causes the voice to alter and the emergence of an unconformable condition in this circumstance, the texture, tone, and volume of a person's voice may fluctuate or be insufficient for his or her gender, profession, ethnic background, or geographic area, depending on the situation. Although there are numerous possible causes of voice issue, there is no single explanation(Smith E et al., 1997). ASHA (the American Speech-Language-Hearing Association) is a professional organization that promotes communication between people who speak different languages (ASHA) says that a voice disorder is defined as when a person expresses anxiety about having an aberrant voice that does not satisfy daily requirements if others do not regard the voice as distinctive or irregular(De Jong et al., 2006).

According to scientific investigations psychogenic vocal problem arises when there is no anatomical or neurological illness adequate to explain for the vocal trouble, also with beginning and persistence of the vocal complexity induced by disordered psychological phenomena (Madeiros et al., 2008). Furthermore, The National Institute on Deafness and Other

Communication Disorders (NIDCD) further states that (NIDCD), "A voice disorder arises when the tone, loudness, or quality of the speaker's voice distracts the listener from what the speaker is saying. It is also a concern if the person who is speaking or singing is experiencing discomfort or weariness while doing so. The term "vocal cord dysfunction" refers to a laryngeal-based respiratory condition that does not usually cause alterations in the voice, but does cause symptoms such as recurrent coughing or clearing of the larynx and sensitivities to certain odors as well as breathlessness(Desjardins et al., 2017).

Because of the pressures placed on their voices for professional reason, a higher chance of developing an occupational voice issue has been observed in academicians, according to recent research. Several studies have looked into the prevalence, forms, risk factors, symptoms, and causes of voice difficulties among academics, as well as the impact of these issues on their performance in the classroom (Kooijmn et al., 2006). Therapeutic, single, intellectual, and psychic factors have all played a part in the development of voice abnormalities in the past. Ergonomics concerns have a major part in the etiology of voice problems in academicians according to recent article. Individual demographic variables can affect the voice problems among academicians like age, female gender, improper or extreme (prolonged) use of the voice, extra-professional activities with high vocal demand (rest and relaxation, or functioning a double shift), breathing hypersensitivity, larynx, hormonal influences, drug, alcohol abuse, inhale, poor hydration, pressure, and gastroesophageal reflux, among others, may act as aggravating and/or triggering factors (Korn et al., 2016).

The academician's voice is a critical instrument in his or her field of study. Every day, they are required to communicate clearly and forcefully. As a result, academicians' use of their voices becomes more intense and persistent, increasing the occurrence of vocal issues(NR, 2003). It is not only a hindrance to their professional performance that they suffer from vocal issues, but it also has a negative impact on the individual. The repercussions of voice difficulties, on the

other hand, are well-considered. Academicians are sometimes forced to shorten regular teaching time or take leave, that has a bad financial impact on the community as a result of this (Akinbode et al., 2014).

### **1.1 Aim and objectives of the study**

The aim of this study was to evaluate the occupational safety and prevalence of voice disorders among academics.

The objectives of this study are to:

1. Classify the types of voice disorders.
2. Analyze the prevalence of voice disorders among academics.
3. Analyze the effective diagnosis process and treatment strategies of voice disorders among academics.

## **Chapter 2**

### **Methodology**

The investigation was carried out through the use of a methodical review of the literature. All relevant publications were gathered from a variety of sources, including Elsevier, the Journal of Voice, Scopus, PubMed, Research Gate, Springer, the National Center for Biotechnology Information, and the Scientific Electronic Library Online (SciELO). Using keywords such as: voice disorders, occupational hazards factors for voice disorders, voice issues in teachers, dysphonia, stress associated with voice disorders, diseases associated with vocal problems, and so forth The risk factors for voice disorder in academicians, as well as the prevalence of voice disorder in academicians, formed the basis of the inclusion criteria for this study. Following that, the abstracts were evaluated, and articles that did not meet the inclusion requirements were excluded from consideration. The amount of evidence, the number of participants, the study design, and the effects on the subjects' ability to speak were all considered in determining eligibility. In accordance with the title and keywords of the articles, about 150 articles have been screened. Then, for the purpose of writing this review paper, around 100 publications were thoroughly reviewed, evaluated, and significant information was gathered. In order to be respectful of the work or the original writers, I have used the Mendeley tool for referencing purposes.



## Chapter 3

### Result and Discussion

Many professionals regard their voice to be a significant tool in their professions, where around 25% of the economically active people thinking their voice to be such. The definition of "normal tone" is complicated, and there is no agreement on it. There is no specified "acceptable voice" patten (Przysiezny & Przysiezny, 2015). The voice is described as disturbed or dysphonic when it alters in a negative way. As a result, dysphonia can be described as any issue or alteration in voice emission that prevents natural voice production and so prevents temporary or permanent spoken communication. Dysphonia causes harm to the individual since the voice generated has difficulty or restrictions in carrying out its primary function of transmitting psychological abuse messages (Vilkman, 2004).

#### 3.1 Classification of Voice Disorder

Classification of Voice disorders are multifaceted, and the classification of these diseases aids in the identification of their origin, anatomofunctional manifestations, and the biopsychosocial aspects that are connected with them. When a classification system is established, it has ramifications for the determination of the best treatment option for each individual patient with vocal issues(Rossi-Barbosa et al., 2016). A variety of classification approaches are used to categorize the wide range of voice disorders but the most widely used classification corresponds to the dichotomous classification between organic and functional voice disorders (FVDs), with FVDs being classified as psychogenic voice disorders (PVDs), primary muscle tension voice disorders (MTVD1), or secondary muscle tension voice disorders (SMTVDs) (MTVD2)(J et al., 2008) .Therefore, the voice disorders can be classified as:

**Organic Voice Disorders:** It arises as a result of a change in the processes of the respiratory, laryngeal, or vocal tracts. The presence of a distinct organic pathologic change in some region

of the phonatory tract can be indicated in organic voice disorders. Organic voice problems can be remote, yet in the majority of occurrence, they are associated with effective disorders of voicing. Specifically, disruption of the design of voice manufacturing (Milutinović, 1996). Improved voice quality occurs as a result of the pathologic change itself, which alters the conditions for voice production, as well as the balance between mechanical and aerodynamic factors of phonation, either directly or indirectly, by virtue of its mechanical properties, or indirectly by direct and indirect influence on the mechanical properties of the important structures of the voice generator and its pronator behavior (Andrea et al., 2017). Organic voice disorders can be further classified as:

**a) Neurogenic voice disorders:** If there is injury to the central or peripheral nerve system that has a relationship with the larynx, an organic voice disorder can emerge. This type of voice disease affects the vocal mechanism. For example, vocal tremor, spasmodic dysphonia, and paralysis of the vocal folds are all possible symptoms(Fujimura et al., 2020).

**b) Structural voice disorder:** A structural alteration of the vocal system is caused by an organic voice problem. Cysts,nodules , polyps, and other growths are examples of such voice disorder (Milutinović, 1996).

**Functional voice disorders:** Functional abnormalities of the voice can occur alone although they are more commonly found in conjunction with organic vocal disorders. Sometimes, as a result of functional voice abnormalities, certain organic lesions of the vocal fold might develop on the vocal fold. As a result of excessive muscular activity of the vocal folds, vocal nodules, contact hyperplasia, vocal fold hematoma, and other manifestations of organic and functional voice disorders can occur, providing more evidence of the etiologic overlap between organic and functional voice diseases(Andrea et al., 2017). A functional voice issue that is followed by an organic alteration (as in the example above) can have an impact on both the condition of the

voice and the laryngeal behavior when phonation is performed. Specifically, the voice quality is low in FVDs, and there is no association between the voice quality and laryngeal symptoms in this group of patients. Any vocal behavior that strains or injures the vocal folds, such as excessive talking, throat clearing, coughing, smoking, or yelling, or any misuse of the anatomic and physiological vocal apparatus, such as speaking at an abnormally high or low pitch, results in the vocal behavior being located at the center of FVDs. Anxiety or depression, a high level of neuroticism<sup>16</sup>, or the existence of personality disorders, may lead to the development of FVDs(Rossi-Barbosa et al., 2016).

### **3.2 Prevalence of voice disorder**

When determining the prevalence of voice problems in academics, it is important to distinguish between objectively diagnosed vocal cord pathology, which is estimated to have a prevalence rate of 4.4 percent and subjective self-reported vocal dysfunction, which has been found to have a prevalence rate of 90%. According to a questionnaire survey 242 respondents who worked as primary and secondary school teachers in the United States, taking teachers as a specific occupational category into consideration (Sliwinska-Kowalska et al., 2006). Although no response rate was provided, just 5% of those who did not return surveys did so because they were not present on the day of collection. They compared the frequency of voice difficulties among people in other occupations with that of those in the medical field. Teacher speech problems were found to be more prevalent (15% versus 6%) in the study population, which covered 10 particular voice complaints as well as five physical signs of discomfort. Hoarseness was the most common complaint among teachers, with 47.5% reporting it compared to 21.3% of controls, and teachers reported an average of nearly two symptoms per day, compared to non-teachers. Despite the fact that over 20% of instructors reported time lost from work due to vocal difficulties, only 0% of non-teachers stated the same(Sala E et al., 2001).

Dysphonia is the most common sign of impairments of oral communication, and it is also the most serious. Aside from difficulty in keeping the voice (asthenia), other symptoms of voice disorders include vocal tiredness, fluctuation in the habitual vocal fundamental frequency of the voice, hoarseness, lack of vocal volume and projection, loss of vocal efficiency, and weakness when speaking. There are various proposed etiologic classifications for dysphonia, including functional voice disorder, organ functional voice disorder, organic voice disorder, and job voice disorder (Lietz et al., 2018). In 2012, the University of Southern California (USC) voice center reported that teachers are more susceptible to developing vocal problems than the general public because they continuously speak on a daily basis for a long period of time in a noisy environment more than the general public, sometimes without the use of an amplification system ("Facts about vocal health for teachers") Furthermore, experts discovered that teachers suffer from more vocal issues than the general population or any other occupation that relies on the use of one's voice, according to their research. Many research, on the other hand, have examined the intensity and occurrence of voice issue among instructors. According to a study conducted in Germany, teachers had a higher prevalence of voice issue than the general population. The findings of the study also shed light on the ramifications of voice dysfunction (Sanssené et al., 2020). According to the results of a questionnaire survey conducted among 1082 primary school teachers, 188 teachers said that they were suffering from vocal disorders, and 38% (n = 71) of the instructors reported that they needed to reduce their teaching hours for less than seven days. Aside from that, 11% of the participants (n = 21) reported missing work for 8-15 days per year, 0.5% (n = 1) reported missing work for 16–30 days, and 2 % (n = 4) indicated that they had to take time off work because of their voice problem. The teachers were between the ages of 20 and 69 years old, with the average age being 20. The University of Utah found that 600,000 teachers in the United States claim that they need to take at least one day of leave every year to deal with a voice problem that they have (Pestana et al., 2017).

Moreover, according to another study on voice disorder, teachers are two to three times more likely than the general public to suffer from vocal difficulties (20 % to 50 %, and even 80%). It has been found that between 15 and 75% of primary and secondary education teachers in Finland suffer from vocal problems, according to a questionnaire and a clinical laryngoscopy study conducted among 1198 primary and secondary education teachers across Finland. As an additional point of reference, in Belgium, a case-control research was conducted in which a control group was compared to a teachers' group (da Rocha et al., 2017). It was discovered that 51.2% of teachers reported having vocal issues, whereas the rate of prevalence in the control group was 27.4%.

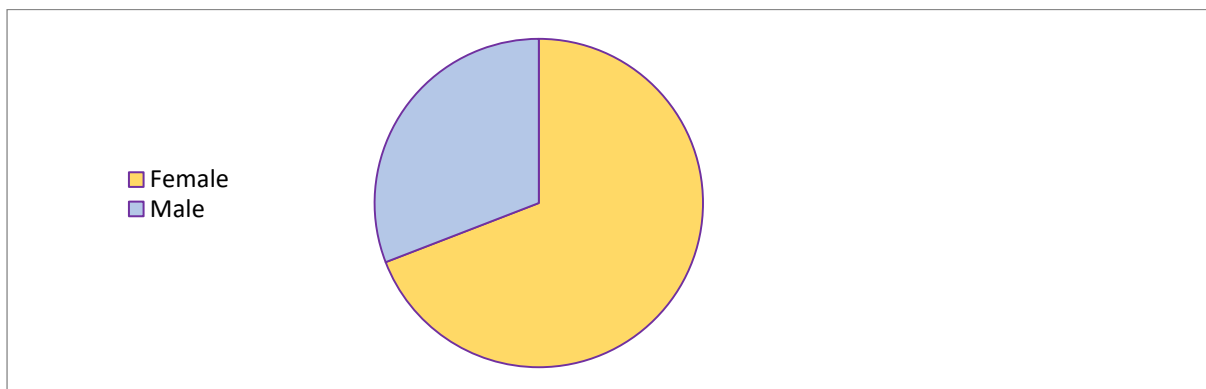
The following table (Table 1) provides an overview based on 1651 questions completed by teachers in Sao Paulo, Brazil, and 1614 questionnaires completed by non-teachers in the same city. According to the findings of the study, 11.6 % of teachers and 7.5 % of non-teachers are currently experiencing voice problems, with 63 % of teachers and 35.8 % of non-teachers experiencing a vocal problem at some point in their lives. This study also found that teachers have more signs and symptoms of vocal difficulties than non-teachers, which is a significant finding (Behlau et al., 2012).

| Variable   |       | Teachers |      | Nonteachers |      | p-value |
|--|-------|----------|------|-------------|------|---------|
|  |       | n        | %    | n           | %    |         |
| Voice does not work or sound as it should normally | Yes   | 1,045    | 63.3 | 578         | 38.8 | <0.001  |
|  | No    | 606      | 36.7 | 1,036       | 64.2 |         |
| Current voice disorder                             | Yes   | 192      | 11.6 | 121         | 7.5  | <0.001  |
|  | No    | 1459     | 88.4 | 1493        | 92.5 |         |
|  | Acute | 694      | 67.1 | 462         | 79.9 |         |

|                                  |         |     |      |     |      |        |
|----------------------------------|---------|-----|------|-----|------|--------|
| Severity of voice disorders      |         |     |      |     |      | <0.001 |
|                                  | Chronic | 341 | 32.9 | 116 | 20.1 |        |
| Multiple voice disorder episodes | Yes     | 656 | 62.9 | 379 | 65.7 | <0.001 |
|                                  | No      | 387 | 37.1 | 198 | 34.3 |        |

*Table 1: Frequency of Voice Disorders between the Academics and Non-academics*

On the other hand, according to a questionnaire survey of Saudi Arabia, female teachers are more likely than male teachers to have strained voice, fatigued voice, quiet voice, sore throats, losing of voice. Additionally, they report more throat tiredness than men (Hunter et al., 2011). When comparing male and female teachers, female teachers score higher on the Voice Handicap Index (VHI) (Ehlert, 2017). According to the figure 1 below, among 400 primary and secondary school instructors in Saudi Arabia, 56% female teachers and 34% of male teachers reported having vocal issues, respectively (Ehlert, 2017).



*Figure 1 Prevalence of voice disorder between male and female (Manfred Nusseck et al., 2018)*

### **3.3 Diagnosis of voice disorder**

It is estimated that over 30% of the adult population may experience vocal issues at some point in their lives, which can be either chronic (21.5%) or acute (78.5 % ).<sup>1</sup> As a result, their voices will not perform or sound as they are accustomed to, which may have an influence on their ability to communicate and work, as well as their general quality of life(Desjardins et al., 2017). Hoarseness, breathiness, aphonia, vocal fatigue, and pain are some of the symptoms that have been reported, and all of these can make it difficult to go about one's regular duties. When it comes to social interactions, emotional well-being, and health, voice abnormalities can have an influence on a person's life on a level that is comparable to that of other chronic diseases such as heart failure, angina, and chronic obstructive pulmonary disease(Pasternak & Thibeault, 2020).

In the majority of cases, behavioral voice therapy directed by a speech-language pathologist (SLP) is the primary treatment option for voice abnormalities; in the minority of cases, it is advised in addition to medical or surgical treatment (Ziegler et al., 2010).

The following information is needed to diagnose Voice disorder-

- Medical, occupational, and employment history, as well as epidemiological information.
- Medical evaluation (ideally performed by an ENT professional) as well as any further tests that may be required (especially laryngoscopy).
- Phono audiological techniques.
- Evaluation of the working circumstances, as well as environmental and organizational risk factors, in the workplace.
- An investigation into relevant behaviors and habits.

### **3.4 Treatment in Voice disorder**

A number of current therapeutic options for the rehabilitation of presbyphonia have been developed, including voice therapy, injectable augmentation, and laryngeal framework surgery. Voice therapy is the first line of defense against this condition. Increased neuromuscular coordination is expected to result from strengthening workouts for respiratory and phonatory control. This modality may result in a subjective increase in one's quality of life as well as a reported improvement in one's voice (Johns et al., 2011). It is recommended that patients get vocal education on the physiology of their problem, practice producing an optimal vocal posture while producing a resonant tone, and standard vocal function exercises to improve the overall balance, strength, and tone of the vocal mechanism. Voice therapy is time-consuming and may be ineffective in extreme situations, necessitating repeated clinic appointments (Przysiezny & Przysiezny, 2015).

A multidisciplinary team composed of a physician, a speech therapist, a physiotherapist, a psychologist, and an occupational therapist may be assembled to provide voice therapy services. When evaluating VD, it is important to consider all of the factors that influence the worker's health state; if treatment is required, it should concentrate on biological, environmental, and personality element improvements rather than solely on the reduction of occupational voice load (Burg et al., 2015). The therapy and rehabilitation program should be tailored to the individual circumstances of each instance, with the goal of restoring the worker's health. Obviously, treatment is dependent on the etiology that has been determined, with choices for medication or surgical treatment available. Any operation must be conducted if it is deemed necessary. The majority of voice problems, on the other hand, can be treated without surgical intervention. Vocal speech rehabilitation is frequently utilized in conjunction with other treatments, and this usually results in greater vocal adaption and a faster return of the



worker to his or her previous work environment. When dealing with an acute dysphonia, it is common practice to recommend vocal hygiene as well as resting the patient (IR et al., 1997).

### 3.5 Impact of voice problems

Due to the fact that a teacher's voice is their primary work instrument, it is quite likely that a vocal deviation will have a detrimental impact on their professional performance. The majority of the time, these professionals teach in substandard conditions for long periods of time, to a large number of students, in hazardous environments, and with little or no prior voice and communication training (Yiu, 2002). A significant prevalence of vocal signs and symptoms in instructors (3.7 signs and symptoms on average for Brazilian teachers and 4.3 signs and symptoms for American teachers) and vocal deviation as a result of these factors is seen (57% for American teachers and 63% for Brazilian teachers) (Behlau et al., 2007).

Table 2 shown the percentage of impact on Voice Disorder (VD) and Non Voice Disorder (NVD) professors.

| Problems                       | VD groups<br>n =27 | NVD Group<br>N =78 | p-value |
|--------------------------------|--------------------|--------------------|---------|
| Repeating statements           | 26%                | 3.7%               | <0.001  |
| Avoiding conversation          | 22.2%              | 2.5%               | 0.001   |
| Reduced phone calls            | 18.5%              | nil                | <0.001  |
| Avoidance of social activities | 11.1%              | nil                | 0.003   |
| Reduction of social abilities  | 7.4%               | nil                | 0.015   |

*Table 2: Impact of voice problems*

Sixty-six percent of teachers with voice issues changed their teaching approaches, compared to only 22% of those who did not have voice disorders. This was found to be very significant ( $p < .001$ ). Teachers in the VD Group were also observed to take more days off work ( $p = 0.003$ ) than those in the other groups. 14.8 % of instructors with voice issues experienced a change of heart about their decision to enter the teaching profession. The general consensus was that they would leave their existing jobs and retire early (7.4 % each)(C & R, 2008). The most often expressed concern among the NVD group members was increased pressure at their place of employment. Almost one-quarter of the teachers in the VD Group avoided having dialogues, compared to 3.7 % of the teachers in the NVD Group. As a whole, it was discovered that teachers with voice abnormalities had communication difficulties when compared to their counterparts in the control group ( $p < 0.001$ ). They were shown to have a higher likelihood of repeating their words ( $p = 0.001$ ), avoiding conversations ( $p = 0.001$ ), and limiting the frequency of phone calls ( $p < 0.001$ ) than other participants. Individuals in the NVD Group did not experience any negative consequences in their social lives(Manfred Nusseck et al., 2018). On the contrary, 22.22 % of instructors with voice disorders reported having a negative social life, with the main point of agreement among this group being a preference for staying away from social events, which accounted for 11.11% of the VD group. When comparing teachers with and without voice disorders, it was discovered that instructors with voice disorder had lower social abilities ( $p = 0.015$ ) and avoided social activities ( $p = 0.003$ ) at a higher rate. A visual representation of this is shown in table 2 (Behlau et al., 2012).

The presence of benign vocal difficulties does not necessarily indicate the presence of a life-threatening ailment, but they can have major negative impact for an individual's occupational, social, psychological, physical, and communicative well-being. In fact, it has been noted that the impact is identical to that observed in people suffering from life-threatening conditions (Vilkman, 2004). Some of the common impacts are:

- Dry throat
- Shortness of breath
- Cannot sing high pitch
- Vocal tiredness/ fatigue
- Frequent throat clearing
- Itchy throat
- Weak voice
- Voice loss
- Cannot sing low pitch
- Loss of voice control
- Pain

The most frequently reported repercussions of voice issues were stated to be missed work, poor job performance, social activities, and negative feelings (Ma & Yiu, 2001). When it comes to the influence of voice problems on an individual, it is not just determined by the severity of the impairment. It also depends on how a person perceives, reacts, and adjusts to the challenge, among other factors. Impairment (activity restriction), disability (activity limitation), and handicap (participation restriction) are all concepts proposed by the World Health Organization (WHO). A useful framework for describing the impact of a problem or a disorder on an individual is provided by the numbers. In accordance with the International Classification of Impairment, Disability, and Handicap (ICIDH) Beta-218, impairment was defined as the result of physical dysfunction (De Jong et al., 2006). A polyp on a vocal fold, for example, is considered a vocal impediment. Activity limitation (formerly referred to as disability) is defined as a lack of ability or difficulty in carrying out daily activities. Previously known as handicap, restriction in participation can be characterized as the decrease or avoidance of voice activities by the individual, which has an impact on his or her vocational or economic

performance. A teacher who has a vocal polyp and is unable to talk loudly when instructing is exhibiting a sort of constraint in the teaching activity in question. If a teacher is forced to change jobs as a result of his or her incapacity to communicate clearly, this constraint on his or her ability to participate in the teaching profession has economic ramifications (Yiu, 2002).

Difficulties in phonation, aberrant vocal characteristics, and/or physical pain or sensation associated with the use of one's voice are also all examples of impact of voice problems. In order for health care personnel to arrange their services correctly in response to how and what activities are being affected by voice problems, information on how voice problems impact persons' daily functional activities is beneficial (Roy, Merrill, Thibeault, Gray, et al., 2004). It is generally agreed that information on how to eliminate the causes of voice problems (such as vocal demand, poor acoustic environments, stress, personality traits, vocal misuses, and hyperfunction) or minimize their effects is useful for assisting members of the teaching profession in avoiding voice problems. In addition, it has been demonstrated that voice treatment programs aimed at educating people on how to manage or adjust these contributing factors can help to enhance the voices of persons who already have dysphonia (Smith E et al., 1997).

## **Chapter 4**

### **Risk factors of occupational nature**

Some individual characteristics, as in all well being-illness procedure, can act as aggravating or precipitating factors. Examples include: generation, feminine gender, unsuitable or intemperate (extended) use of the larynx, extra-professional activities with high vocal demand (such as leisure activities or working a double shift), respiratory allergies, upper respiratory tract diseases, hormonal influences, drug, alcohol abuse, smoking, dehydration, stress, and gastroesophageal reflux disease, among others(de Medeiros et al., 2008).

#### **4.1 Organizational Risk Factors**

Prolonged workhours, overburden, buildup of activities or functions, too much vocal requirements, lack of pauses and resting intervals during the workday, lack of autonomy, a difficult work pace (pressure to meet targets), and dissatisfaction with work or remuneration are all examples of organizational issues that are relevant to the working process (nature of the organization of the working process) (Bermúdez De Alvear et al., 2011).

#### **4.2 Environmental Risk Factors**

##### **4.2.1 Physical hazards**

Insufficient ventilation in the atmosphere, excessive sound pressure, and inadequate illumination are the factors to take into consideration in physical hazards(Sanssené et al., 2020).

##### **4.2.2 Chemical hazards**

Workplace exposure to upper airway irritating chemicals (solvents, metal fumes, toxic gases); presence of dust and/or smoke in the workplace are the factors under chemical hazards(Chen et al., 2010).

### **4.2.3 Economic risks**

Lack of effective design in respect to furniture (which necessitates postural alterations), apparatus and substance funds, the audio conditions, as well as a lack of safe drinking water and easy access to bathrooms, are the economic risk factors(S. M et al., 2002).

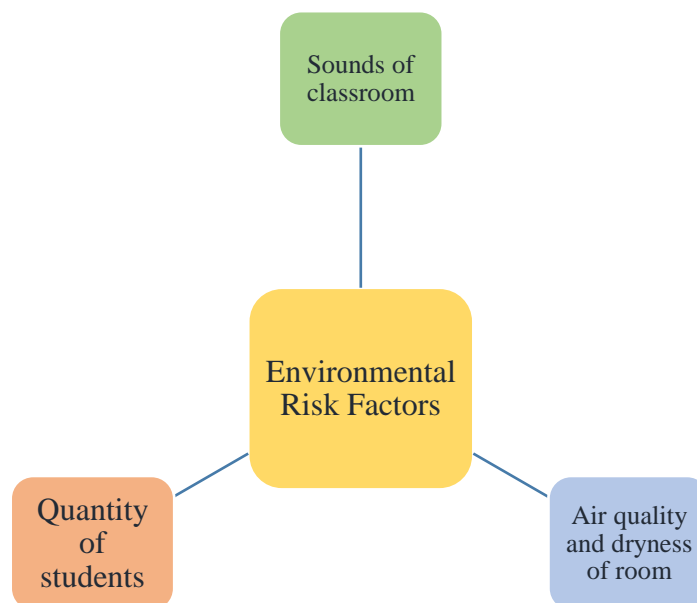
### **4.2.4 Sounds of classroom**

Another factor that contributes to voice issues is sounds of classrooms (such as traffic, construction sites, or boisterous students). The symptoms of the vocal issue are exacerbated when one speaks loudly and continuously. Background noise can impair the quality and clarity of the presentation, requiring the teacher to raise his or her voice in order to be heard by the pupils. Because teachers are sitting or standing only a few meters away from their students, they must raise their voices to a high pitch in order to drown out background noise (Karjalainen et al., 2020). It was revealed that there is a substantial relationship between the strength of teachers' voices and background noise. According to a study conducted on Danish school teachers, the vocal intensity of a teacher increases from 78 to 83 decibels (dB) during the class period, excluding sports, and it increases to roughly 90 dB during sports period, excluding sports period. The voice power of an academician can range from 58 to 90.5 dB in the most intensive situation, which can lead to dysphonia in the long term(Redman et al., 2020).

According to the results of a questionnaire survey conducted among Swedish school teachers, the most common sources of background noise in schools are noise from the outside, such as from streets, construction sites, or cars, audiovisual sources such as printers, air cooler or fan noise, and noisy students . At a cross-sectional study conducted in five public and private schools in the state of Paraba, 44 instructors (ranging in age from 18 to 50 years) stated that they needed to speak out loud because of the noisy environment, and 37.5% of the teachers reported feeling hoarse after class. Despite this, teachers who suffer from voice problems report

that they are subjected to a higher level of background noise than their counterparts who do not suffer from voice disorders(Manfred Nusseck et al., 2018)

Aside from that, according to a study conducted on 187 instructors in the city of Khobar, Saudi Arabia, 34.6 % of the teachers complained of loud background noises that forced them to speak at a high pitch. Hoarseness was reported by 27 % of those who worked in the classroom (Seifpanahi et al., 2016). Furthermore, background disturbances have a negative impact on the voice as a result of the Lombard effect, which is the reason of the vocal effort to rise in noisy environments. Teachers have a tendency to raise their volume up to.65dB each dB when speaking. For example, laboratory investigations demonstrate that the Lombard slope varies between 0.22 and 0.82 dB during the course of training(Alva et al., 2017).



*Figure 2: Different environmental factor of voice disorder*

Many studies, on the other hand, contend that they have not discovered any causal link between voice problem and background noise. After analyzing the responses of 476 teachers (mean age 40.7 years) from elementary and secondary schools in the city of Salvador, Bahia, it was determined that there is no direct relationship between background noise and voice

abnormalities(Alva et al., 2017). They do, however, clarify that variables such as speaking continually, insufficient vocal rest, dehydration, behaviors such as smoking and alcohol consumption, and other factors, as well as background noise, may cause the vocal symptoms to appear.

Noise levels in the classroom should be kept at or below 35-40 decibels (dB) at all times. However, numerous investigations have discovered that schools have failed to manage the noise level, with the background noise level occasionally being 10-15 decibels higher than the acceptable level (Devadas et al., 2020).

#### **4.2.5 Quantity of students**

When it comes to voice difficulties, the quantity of students in a class is also taken into account as a potential risk factor. Teachers who deal with obnoxious students are twice as likely as the general population to suffer from voice disorders (odds ratio = 2.01). There are two main reasons for taking this into mind. The more students there are in a class, the greater the amount of vocal effort that will be required. Another factor is that the large number of people raises the intensity of background noise. Because of the background noise, it is necessary for teachers to speak loudly in order to attract the attention of their students. Because of this, pressure on the vocal cord raises the tensile strain on the mucous membranes, which is harmful(S. M et al., 2002).

In order to investigate the association between the number of pupils a teacher teaches and vocal difficulties, 133 Brazilian school instructors were divided into three groups according to the number of students they taught. The following table (table-3) illustrates that when the number of students in a class increases, the % age of teachers who have voice difficulties increases as well. Furthermore, the study reveals that female instructors ( $p=0.02$ ) were statistically more likely than male teachers ( $p = 0.42$ ) to suffer from voice disorders in the workplace(Behlau et al., 2012).



| No. of student s/class | No. of Female teachers | No. of female teachers having voice disorders | % of female teachers having voice disorders | No. of male teachers | No. of male teachers having voice disorders | % of male teachers having voice disorders |
|------------------------|------------------------|---|---|----------------------|---|---|
| 1–40                   | 36                     | 24  | 66.66                                       | 9                    | 1   | 11.11                                     |
| 41–55                  | 56                     | 41  | 73.21                                       | 5                    | 2   | 40  |
| >55                    | 25                     | 25  | 100   | 2                    | 2   | 100                                       |

*Table 3: Association of Voice Problems with Number of Students in Class*

#### **4.2.6 Air quality and dryness of room**

The change in temperature has an effect on the comparative density of the air in the surrounding area. Humidity has a significant impact on the human voice's responsiveness. A limited period of exposure to low humidity might cause a disturbance in the vocal fold's function. There are a variety of things that can interfere with the mechanism of the vocal fold. In particular, one of the most significant aspects to consider is that changes in humidity have an effect on the water content of the tissue and mucus of the vocal folds (Redman et al., 2020). As a result of oscillations in viscosity and mucus state, the vibratory pattern compensates for this. The air pollutants and temperature fluctuations are also element in the growth of voice disorder difficulties. Individuals who suffer from voice disorders frequently remark that parched or poor air quality make their voices sound hoarse. Several laboratory investigations conducted on both structured hydration and surrounding humidity levels have revealed that it irritates and dehydrates the mucus membrane of the voice cords (Bermúdez De Alvear et al., 2011). Additionally, factors such as air quality have an impact on the ability of the vocal cords to

vibrate. The quality of indoor air also plays a crucial influence in the development of dry throat . It was discovered through research conducted on Latvian primary and secondary school teachers that 235 teachers who were experiencing vocal difficulties also reported poor air quality in their classrooms. Their findings did not support this, but they did propose that the classroom temperature ranges from 15-20°C in winter and 20-26°C in summer is the most ideal setting for voice learning(da Rocha et al., 2017).

### **4.3 Personal Risk Factors**

#### **4.3.1 Different habits:**

**Habit of Smoking:** The use of tobacco products is a substantial risk factor for organic voice problems. Several types of study have revealed that smoking increases the likelihood of developing vocal difficulties. Vocal attrition can be caused by smoking. Furthermore, smoking causes pain in the larynx, and studies have indicated that smokers are 2.2 times more likely than non-smokers to suffer from laryngeal pathology. Furthermore, teachers who smoke are at 2.9 times greater risk of getting laryngeal disease(Gassull et al., 2010). In one study of Finnish primary and secondary school teachers, researchers discovered that those who smoke regularly are more likely to develop erythema, vocal fold swelling, and inflammation throughout the voice tract. Additionally, smoking can raise the risk of developing a small, non-cancerous growth polyp in the vocal cord, which results in a low, breathy, and rusty voice. Furthermore, habitual smokers are more likely than non-smokers to develop vocal nodules, cysts, and Reinke's edema, as well as suffer from persistent dysphonia(G et al., 2007).

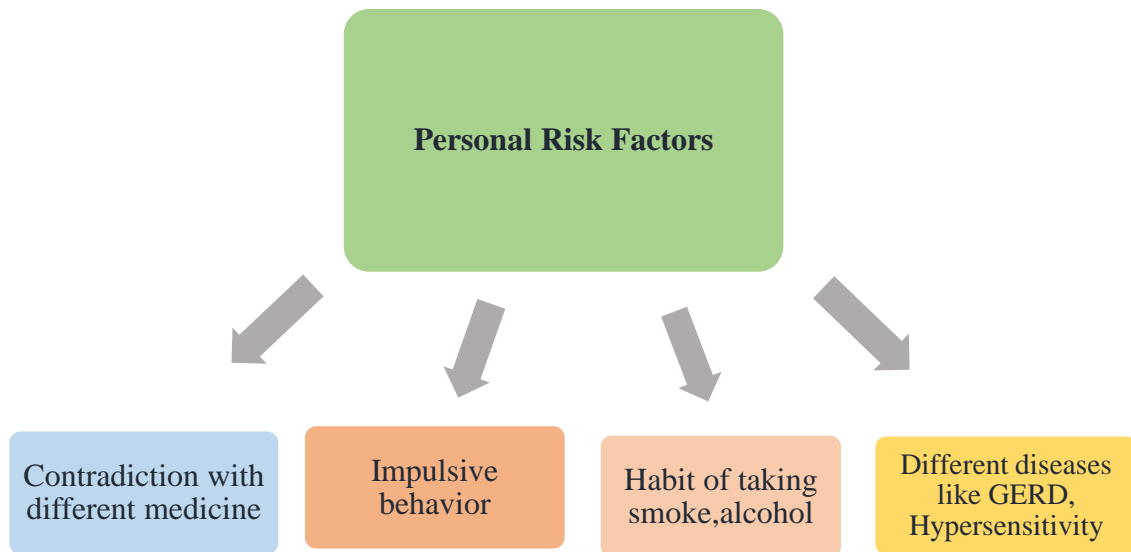
**Habit of caffeine intake:** Caffeine consumption, according to research, may increase the likelihood of developing vocal difficulties. The results of an investigation into Portuguese primary and secondary school teachers reveal that, when comparing the professors' group to

non-voice experts, referred to as the control group, the teacher group reported more instances of drinking tea or coffee than the non-voice professionals(Bermúdez De Alvear et al., 2011). The teacher's group provided information about symptoms such as dry mouth, coughing, and frequent throat clearing, which led to the study's conclusion that tea or coffee drinking was a risk factor for voice difficulties. The cause of these types of symptoms could be dehydration as a result of the diuretic qualities of black tea and coffee, which can cause dehydration. Some research, on the other hand, were unable to find any evidence of a caffeine-related influence on vocal performance. For example, a study conducted on 16 healthy adults who ingested coffee over the course of two sessions found that caffeine had no significant effect on their voice(Alva et al., 2017). The tiny sample size, as well as the lack of double blinding, within-subject controls, and temporal controls, were cited as reasons for the decision. Furthermore, it is possible that the lack of a statistically significant result was due to the fact that the low dose of coffee employed in this trial did not cause enough systemically thirst to provide an impact on speech(Devadas et al., 2020).

**Habit of drinking Alcohol:** The use of alcoholic beverages may result in a dry throat or soreness in the throat. Alcoholics are more prone than non-alcoholics to suffer from a variety of vocal abnormalities, according to research. Alcohol causes the throat muscles to constrict, resulting in a reduction in the intensity of the voice(Yiu, 2002). Furthermore, the narcotic impact of alcohol intensifies the laryngeal pain, and as the effect wears off, the sensations of stinging, burning, hoarse voice, and faint voice begin to occur. These symptoms, on the other hand, arise after taking more than two or more units of alcohol in a single sitting(Chen et al., 2010).

In spite of this, some studies have failed to discover any link between alcohol use and vocal difficulties. It is possible that this is the reason why persons who are experiencing symptoms such as dry throat or throat pain are more prone to avoid alcohol. The fact that a smaller

proportion of participants consume alcohol in particular studies does not necessarily imply that it has a significant impact on the outcomes(Sanssené et al., 2020).



*Figure 3 Personal risk factors of voice disorders*

#### **4.3.2 Different diseases**

**Dysphagia Disease (GERD):** Gastroesophageal reflux diseases (GERD) has also been identified as a significant risk factor for vocal abnormalities, particularly dysphonia. Teachers who are experiencing voice difficulties have also reported having GERD. When it comes to acute laryngitis, one of the most common causes is extreme vocal abuse(Alva et al., 2017).

It is a type of reflux that affects the pharynx and larynx directly or indirectly through a secondary mechanism. The Pharyngitis Reflux is one such type of reflux. To give an example, acid irritation in the distal esophagus, which also damages the laryngeal mucosa, might cause chronic throat clearing and coughing. Furthermore, bile salt reflux can cause irritation of the laryngeal mucosa as well ( Kooijman et al., 2006). Because of this, Laryngopharyngeal reflux can cause chronic coughing, dysphonia, nasal drip, throat clearing, hoarseness, shortness of

breath, and other symptoms such as these: Furthermore, because acid reflux causes the laryngeal mucosa to become exposed, it can result in laryngeal injuries such as nodules, polyps, and granulomas developing. Teachers with gastroesophageal reflux disease (GERD) were found to be 4.8 times more likely to suffer from dysphonia. Following these discoveries, LPR is now recognized as a risk factor for voice dysfunction. However, the reason for these could be due to a hectic schedule; for example, teachers who have a hectic schedule are more likely to eat fast food or junk foods, which can promote acid reflux and, ultimately, acid laryngitis (Chen et al., 2010).

**Hypersensitivity:** Generally speaking, both theoretically and clinically, inflammatory laryngitis is seen as a secondary condition of other disorders such as seasonal allergies or asthma. Snoring, nasal pruritus, breeze restriction, and pinched discharge are all common indicators of hypersensitivity rhinitis, which is considered to be a substantial risk factor for voice dysfunction. It is believed that these symptoms of AR are produced by IgE-mediated responses against inhaled allergens, which result in mucosal inflammation mediated by type 2 helper T (Th2) cells (Kostyk & Rochet, 1998). Patients with vocal issues have been discovered to have a high incidence of allergies, according to research. Furthermore, in the case of LPR, AR is recognized to be a secondary source of dysphonia in some patients. Laryngopharyngeal reflux (LPR) is characterized as an extra esophageal variation of gastroesophageal reflux disease (GERD) that involves the larynx and pharynx. When the nasal cavity is closed, the negative pressure in the larynx mucosa can easily impact certain receptors in the mucosa of the larynx. It is believed that allergic responses alter voice functioning, causing inflammation in the larynx. Because of this, postnasal drainage to laryngeal tissue during an episode of AR is produced by nasal hypersecretion and resulting in dysphonia, frequent difficulty speaking (Bermúdez De Alvear et al., 2011).

**Infection of the Upper Respiratory Tract:** In a visual laryngoscopy study of 786 male elementary and secondary level school instructors and 1233 female primary and secondary school teachers in Brazil, it was discovered that 41% of teachers with upper respiratory infections had voice problems. In addition, instructors who suffer from upper respiratory infections are more likely to acquire vocal nodules, vocal cysts, and acute laryngitis than the general population (Behlau et al., 2007). Additional research has found that instructors are more susceptible to upper respiratory illnesses than the general population when it comes to professional voice users. 4.8 times more likely than healthy teachers, teachers who suffer from upper respiratory difficulties are at risk of having voice problems. Infection of the respiratory diseases such as sore throats, tonsillitis, and pharyngitis can have an effect on the ability to speak clearly. These infections affect edema of the mucous membranes of the respiratory and vocal tracts, which makes the vocal folds more sensitive (Lietz et al., 2018). When the vocal folds are affected by a pathological disease, their vibration model changes, and their tolerance to load decreases, resulting in hoarseness of voice or full loss of voice, which is known as aphonia. Teachers, on the other hand, may develop URTI as a result of chalk dust and grime. When URTI progresses to laryngitis, the surface layer of the vocal fold becomes more constricted. Consistent use of the voice while suffering from laryngitis causes inflammation of the vocal fold, which has a negative impact on voice output. As a result of the increased effort put out in presenting the lecture, vocal fatigue develops during the presentation. The result is that URTI can cause hoarseness of the voice or even full absence of tone in some cases (da Rocha et al., 2017).

#### **4.3.3 Medicinal risk factor**

Enhancing the chance of developing voice difficulties with some medications such as decongestants, antihistamines, and antidepressants. Among other things, it has been discovered that steroid inhalers, which are used to treat bronchi smooth muscle tension and airway mucosal

inflammation, might cause dysphonia in asthma patients by causing fungal and nonspecific laryngitis in these people. Furthermore, antihistamine medications for allergies might cause mucus to dry out, resulting in vocal cord damage(Bermúdez De Alvear et al., 2011).

According to the data in the following table 4, teachers who are experiencing vocal problems are more likely to take medications than instructors who are not experiencing vocal problems. There are two ways to characterize the current situation. One reason is that they are taking medications for vocal difficulties. Another possibility is vocal issues as a result of medication usage, as several medications might have negative effects on the vocal chords(Chen et al., 2010).

| Variable   | VD |      | NVD |     | p-value |
|------------|----|------|-----|-----|---------|
|            | n  | %    | n   | %   |         |
| Medication | 18 | 33.3 | 5   | 8.6 | 0.001   |

*Table 4: Medication Intake of Voice Disorder (VD) and Non Voice Disorder (NVD) group*

#### **4.4 Impulsive Behavior Factors**

Clinical depression have been discovered to be associated with vocal disorders. When someone is experiencing emotional discomfort, their voice shakes and trembles, and they may have difficulties generating sound. Patients who are coping with stress, worry, or depression are more prone to suffer from muscle tension dysphonia, benign vocal fold damage, a paradoxical abnormality of vocal fold movement, and insufficient glottal closure, among other symptoms(Pasternak & Thibeault, 2020). Furthermore, it has been discovered that those who are hyperactive suffer from hyper-functional dysphonia. It is possible for muscle hypertension to develop as a result of the hyperactivity of the autonomous and peripheral nerve systems. Furthermore, the relationship between stress and vocal dysfunction is cyclical. Vocal disorders are caused by stress, which in turn is caused by voice issues( Sodersten et al., 2002).

According to one study conducted on teachers at nursery and primary education institutions in Barcelona who work with children aged between 3 and 11 years, stressed instructors are more susceptible to voice abnormalities than other teachers in the same field of study. In addition, teachers who have vocal difficulties are more reactive to stress than their peers(Ma & Yiu, 2001).

Voice issues can be caused by a variety of psychological causes as well. It has been discovered that stress is one of the most significant causes of muscular tension dysphonia, also known as non-organic dysphonia. Conflicts with colleagues, a reduced opportunity of demonstrating creativity, indiscipline kids, and poor working conditions are all examples of stressors that can lead to voice disorders in teachers, among others(Ziegler et al., 2010).



## **Chapter 5**

### **Challenges for Academics**

#### **5.1 Proper communications with listeners**

Communication is essential for education, yet today's teaching materials frequently make it difficult, rather than easy, to communicate in the classroom. Teachers' voice fitness, also their common well-being and students' presentations, are all negatively affected by poor sound conditions. Professors' throat fitness is harmed by the continual use of their voices in noisy environments, resulting in recurrent hoarseness and vocal fatigue. It suggests that the conjunction of professors with dysphonic voices of reason in noisy venues is detrimental to students' education (Karjalainen et al., 2020). It is possible that the general communication in the classroom would be substantially hamper. Teachers' use of language and other aspects of physical communication in their interactions with students in the classroom are the subject of this study, which is titled "Classroom Communication." A variety of factors, such as speech intelligibility, speech rate, vocal intensity, and voice quality, as well as the employment of gaze, gestures, and positions by teachers in the classroom, are taken into consideration (Zambon et al., 2014). For example, Lyberg-Hlander discovered that 18 % of instructors who reported voice issues in her studies had contemplated abandoning the profession because of the excessive vocal workload. As a result of "stress and other mental strain," teaching was found to be the profession with the highest % of work-related disorders in Sweden in 201(V. E, 2000).

Beebe observed in 1980 that teachers' education does not adequately prepare them in the art of body communication. In spite of the fact that this work and information has been around for almost 40 years, physical communication skills are still only partially taught in Sweden's teacher education programs today, and they are also underdeveloped in in-service teacher training(Ferreira et al., 2013). Carter's evaluation of Initial Teacher Training (ITT) in England

provides excellent examples of how to instruct new teachers on how to use their voice and body language effectively. The report makes the following recommendation regarding behavior management: "All initial teacher training programs, for example, should support teachers in developing their own instructional existence and contain utilization speech, body posture, including how to establish and set up rules and routines and neutralize cases." Unfortunately, many teachers lack classroom communication training, and as a result, they are ill-equipped to optimize their interactions with students in general, let alone navigate around any difficulties. Teachers, in particular, are frequently interested in learning more about how to modify their methods in order to assist kids with a variety of speech and language development issues(Merrill et al., 2004).

When it comes to academic stress in Sweden, one study found that 15% of the teachers were classed as having significant stress in at least two of the three dimensions: fatigue, cynicism, and work performance. As defined by the questionnaire used for screening for stress, which is fatigue and exhaustion in relation to three specific areas of a person's life, stress is characterized as follows in the current paper This includes sectors such as personal relationships, professional relationships, and client relationships, where client is a large phrase that includes dealing with students, young children, and patients, among other things(Meier & Beushausen, 2021). It is important for professor to focus on boosting teachers' belief in their own ability to manage their classrooms in order to reduce and prevent boredom. Language teaching surroundings, language learning activities, and language learning engagements are the three categories that ockrell and colleagues identified when categorizing evidence-based language and variables promoting communication. When it comes to the physical environment environment and learning context, for example, the sound and light conditions, the teaching surroundings dimension is concerned with the physical environment and learning context; the language-learning possibilities dimension is concerned with the structured opportunities to support children's language

development, such as opportunities for group work and interactive book reading (Johns et al., 2011). Finally, the language-learning interaction dimension is concerned with the various ways in which adults communicate with children through verbal and bodily communication, including sentences, enlargement, language, accent, movement, and gaze behaviors. These research resulted in the development and piloting of an observation tool, the Communication Supporting Classroom Observation Tool (the CsC Observation Tool), which was then tested in over 100 classrooms to determine its feasibility (Simberg et al., 2005).

## **5.2 Listener's Perspective**

The school's working environment is shared by both the teachers and the students that attend. There is currently no law regulating the employment circumstances of youngsters. Although there are certain occupational recommendations regarding sound levels, the noise ratio reverberation time, and other factors, it is unclear whether these advice are applicable to students. For efficient communication in working environments where speech communication is vital (such as operating rooms), the external noise level should not exceed 55 dBA (Vilkman, 2004). This is the general rule of thumb. As previously stated, the average ambient noise levels in classrooms and kindergartens range between 55 and 75 decibels. When the suggestion for a signal-to-noise ratio of +15–20 dB is taken into consideration, the requirements for the voice output level become extremely high. Furthermore, for trained listeners, the use of a screaming voice diminishes speech discrimination by as much as 70% (Greve et al., 2019). The signal-to-noise ratio is significant from the perspective of student with developmental issues, particularly language impairment, but it may be an overly detailed periodic because small noise intervals naturally distract and decrease concentration. Student's language clinicians frequently assign rehabilitative activities to primary schools and schools, which presents a significant difficulty for educators. It is impossible to reach treatment goals if the kid does not have proper listening

conditions. In addition, an attention deficit may worsen, affecting the working conditions of the child in question, the other students, and the professors (Temesgen et al., 2019).

The large bulk of actions to improve the working conditions of teachers are also beneficial from the perspective of students. Background noise reduction is one of the most significant goals. Evidently, the main point of contention is the resonance properties of the room, which appears to be the only one. A longer resonance period is preferred by the speaker or vocalist, whereas direct sound is preferred by the listener. In other words, if speech amplification is not used, excessive acoustic damping of resonance may cause difficulties for the speaker( Thibeault et al., 2004).

### **5.3 Proper Intervention program**

The intervention program's goal was to develop teachers' knowledge of teaching methods while also strengthening their practical abilities through the use of scientific proof instructional interactions to support classroom communication in the classroom. The conversations were centered on the following topics: utilizing healthy voice style, adjusting voice use to the acoustic environment, maximizing body communication, and strengthening language learning spaces, among others (Karjalainen et al., 2020). A collaborative learning strategy was employed under the guidance and supervision of an SLP, who was also the initial author, to achieve the desired results. According to Houmann and Saether , in order to improve language learning interactions, rich opportunities to increase one's own understanding, receive feedback on teaching practices, observe competent model teachers, refine and develop teaching practices by learning from one another are required. The intervention was planned in this manner. Teacher communicative strategies and language learning procedures were improved as a result of group discussions about real-life experience (EP & EM, 2001). This was one of the features that were used to bring the training as near to practice as possible. The data was gathered

through video recordings and peer observations of real-world classroom scenarios. It was feasible for the teachers to concentrate on various sections inside the intervention based on their requirements and preferences during the intervention. The talk on voice function in theory was followed by guidance on vocal hygiene and vocal health, as well as practical voice exercises (posture, breathing, and phonation) (Roy et al., 2004). Voice acoustics is a set of actions designed to improve the conditions for verbal communication, both for the speaker and the listener, and it was developed in the 1960. Voice physiological elements in their employment, such as air quality and the ability to take a break from speaking, were discussed with them. The voice ergonomic evaluation technique developed by Sala et al. was given to the teachers in order for them to be able to detect possible risk factors at respective jobs (Kooijman et al., 2006).

Among the topics covered in room acoustics was information on sound environments in schools and how various features of the sound environment affect individuals. This knowledge was presented by a guest lecturer who was an acoustician who specialized in educational facilities and who offered this information. Discussions and reflections regarding the acoustic environments at their respective places of employment occurred shortly afterward (Roy, Merrill, Thibeault, Parsa, et al., 2004). Teacher observations included, for example, the sound of the ventilation system and the excessive level of noise in the canteen. The topics discussed included, for example, how to deal with excessive loudness from students in the classroom. A language interaction aiming at raising awareness of and developing skills in speaking activities was conducted. In this study, the CsC Observation Tool (Swedish version ) was used as an observation tool to make teachers aware of the ways in which language learning surroundings, possibilities, and relationships might promote or hinder oral language abilities in students. During the duration of in-service training, a colleague observed the CsC twice and recorded his observation (Rogerson & Dodd, 2005). Teachers were encouraged to share examples of

effective language engagement in the classroom during the discussions. With variety in speech production, tone, stress, and intonation, as well as look, mimics, gestures, and voice, body communication featured SLPs' input on different components of speech and body communication that alternated with practical exercises and feedback on delivering a message. At two of the schools, the lessons took place after school hours and learnt, as well as how to put their newly acquired competence into action. Data analysis and statistical computation (Kyriakou et al., 2018).

#### **5.4 Satisfaction with the voice training**

The fundamental ideas of the role of training in the workplace safety and health environment may shed light on the role of prevention and treatment of occupational voice disorders. The examination of the nature of the problem is the first step in the procedure. Instead of training, administrative (e.g., smaller teaching groups) or technical (e.g. voice amplification) measures can sometimes be used to more successfully resolve the issue (Bovo et al., 2013). In the subject of vocoergonomics, individual training is necessary, but it is not adequate in order to control occupational health hazards at a reasonable cost/benefit ratio. However, if it is determined that training can be used to solve the problem, the next stage is to assess the demands of the client and the characteristics of the learner, as well as to establish goals and priorities. It is necessary to identify instructional objectives in terms of relevant learning domains in the third phase before designing and implementing training (Meier & Beushausen, 2021). The next phase is to evaluate the outcomes, which entails answering the following questions: Were the goals established for training met, and if not, was this owing to the program's ineffectiveness? As a result, depending on the goals specified, it is evident that completely different training options will be made, such as whether the problem is perceived to be the voice quality or the method of coping. In conjunction with the CSA investigation, the effects of a short vocal training course (two days) were investigated. The overarching goal of the employer was to limit the amount of

sick-leave absences due to voice failures by as much as possible and looked at the working environment, subjective vocal loading-related complaints, and the voice load while in the office. With the help of questionnaires, we were able to learn about vocal complaints before and after the course, as well as indicators of voice fatigue during the course (Moy et al., 2015). Voice issues were reported at relatively modest levels by the subjects on average, according to the study. Throughout the course of the working day, all of the characteristics that suggest vocal tiredness changed statistically significantly. The short vocal training course decreased the average level of voice complaints and the degree of voice tiredness throughout the working day decreased little but statistically significantly as a result of the course. A follow-up study found that the favorable benefits of the course could still be identified 18 months after the conclusion of the course (Karjalainen et al., 2020).

## **5.5 Perceptual evaluation of the quality of the voice**

As an auditory-perceptual evaluation instrument, the CAPE-V (Consensus Auditory-Perceptual Evaluation of Voice) was utilized to gather consensus on the evaluation of voice. Developed by speech-language pathologists affiliated with the American Speech-Language-Hearing Association, this instrument was designed to assess the severity of auditory perceptual characteristics associated with voice deviation. Its primary goal is to describe the severity of the auditory perceptual attributes associated with voice deviation (Desjardins et al., 2017). Severity degree was measured using six preset parameters: overall seriousness level, harshness (breathiness), stress (pitch), and intensity (volume). Two additional elements, including an evaluation of resonance, were also measured. In order to determine the degree of departure from the parameters, a visual analog scale with a length of 100 mm (0–100 mm) is used. The scale provides reference points for determining the severity of voice alteration, with the following categories: mild, moderate, and severe. A marking toward the left end (0) indicates that there is no vocal deviation, and a marking toward the right end (100) indicates that there

is a substantial vocal deviation. To evaluate the general vocal modification, just the overall severity degree parameter of the CAPE-V was analyzed<sup>25</sup>, rather than any specific vocal parameter, for the purposes of the current investigation(Desjardins et al., 2017).



## Chapter 6

### Preventive measures

Preventive measures begin with the identification of a condition that poses a threat to the health of the worker. The role of the occupational physician, as well as the roles of the other healthcare team members and the health insurer, is critical for the following: the control of risk factors, the inclusion of the worker in the discharge from the work place, proper rehabilitative services, and usable realignment. Preventive measures should be implemented as part of the overall care provided by the voice professional's team (RE et al., 2017). Nevertheless, in order to reduce the likelihood of developing dysphonia, the worker is typically not given any information on the function of the vocal folds. Many voice professionals, it has been observed, do not have specific training (vocal technique) or any form of orientation for such intensive use of the voice in often unpleasant settings, and as a result, they are more susceptible to harm. When comparing it to any other regular exercise, an athlete must train the specific muscles involved in his or her activity for years while also undergoing cardiopulmonary preparation in order to achieve good performances; athletes who are not properly trained or who are not physically prepared for their physical activity risk suffering injuries that are specific to their physical activity (Sala et al., 2001). Even as particular information about the regular exercise undertaken by an athlete is required for proper training, specific knowledge about the voice professional's field is required for proper treatment. This vocal care is properly shared among professor, but regrettably, this is not the case among other workers. In light of the fact that WRVD has a significant influence on society's social, economic, professional, and personal well-being, it is critical that preventive efforts that may delay the onset of this event are prioritized. Taking preventative measures for vocal health includes taking protective and preventive steps, which must be tailored to the individual requirements of the various working situations (Thomas & Maruthy, 2020). The following are some examples:

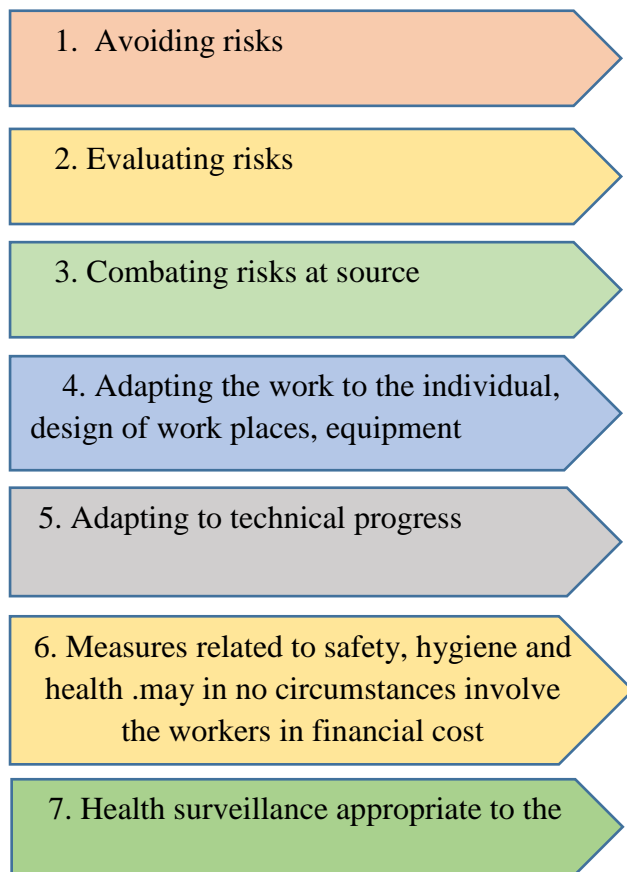
- The right use of the voice is promoted by educational and therapeutic acts aimed at promoting health promotion through conceptions of anatomy and physiology of the voice tract, vocal care (vocal cleanliness), vocal warming and cooling down, and vocal fluidity.
- Participation in an internal accident prevention week, lectures, campaigns, seminars, and specific training are all examples of activities that promote vocal health and avoid vocal complaint/disorders.
- Preventive measures such as medical evaluation and frequent phonoaudiologic analysis can aid in the early detection of complaints and voice changes.

## **6.1 Occupational Safety**

Occupational voice disorders that impair working abilities are widespread in jobs that require a great deal of vocal effort (for example, school and kindergarten instructors). It is a combination of prolonged voice use and additional loading factors (for example, background noise, acoustics, and air quality) that affect the fundamental frequency, type of phonation, and loudness of phonation, or the vibratory characteristics of both the vocal folds and their surrounding external frame (Vilkman, 2004) . It is also referred to as laryngeal overloading. Improvements in occupational safety and health (OSH) arrangements for voice and speech specialists are needed to aid in the prevention and treatment of occupational voice disorders (OVDs). Based on epidemiological and acoustic-physiological studies, it is possible to demonstrate that there is a risk to the health of the voice. Initializing physiological changes (adjustment) in the vocal apparatus may have a role in the development of occupational risk when considering the physical load on the vocal apparatus. Changes in vocal loading are influenced by environmental influences. Children share the working environment with those in teaching professions, and they benefit from changes to occupational safety and health legislation that apply to their teachers(Isaac et al., 2017).

Directives on occupational health and safety have been issued by the European Union, with the most significant being "the framework directive," which sets out the broad principles for introducing measures to stimulate improvements in the safety and health of workers while at work. For example, the fundamental occupational safety and health principles declare that the employer must have a responsibility to safeguard the safety and health of employees in every element of work, and that (M. Nusseck et al., 2017). The employer is responsible for taking the steps necessary for the protection of workers' safety and health, the prevention of occupational risks, the provision of information and training, and the provision of the necessary organization and means. Flow chart 1 shows the principles defined in the same directive concerning the prevention of occupational ill health, which are as follows: According to current occupational safety and health legislation, an investigation of the relationship between the individual, the job task, and the environment should be the beginning point for comprehending problems that arise at work. The assignment should be modified to accommodate the individual, not the other way around. All employees have a legal right to receive occupational safety and health services (Vilkman, 2004).

On the basis of occupational safety and health (OSH) the general principles of prevention are:



*Figure 4 OSH principle of prevention voice disorder*

Teachers' daily profession is characterized by a high vocal load with constantly changing vocal demands (talking, shouting, singing, etc.), speaking in and against noise, and speaking in insufficient room acoustics on a regular basis, among other things. In order to achieve these standards, voice seminars or training must include at least three modules: the introduction of a cost-effective vocal technique, a personalized coaching component for each teacher, and information on how to improve the acoustics of the space and deal with noise (Johns et al., 2011). In order to prepare for professional voice use, a voice training program has been devised that focuses on vocal exercises as well as the alteration of behavioral factors. Individually, standard practices of voice hygiene information and vocal exercises are tested in communication settings that are relevant to the participating teachers' jobs. It is also explained

how to deal with job-specific variables such as vocal tension, room acoustics, and noise reduction (Karjalainen et al., 2020).

A major focus of the voice training is on tools and tactics that participating instructors may put to use in their daily work and that are simple to execute. Individual or group training is used to clarify the seminar themes to instructors in the context of specific voice-intensive scenarios that arise in the course of their everyday work. In December 2014, a total of 36 speech-language pathologists were qualified to teach the curriculum that had been designed at the time (Meier & Beushausen, 2021). The qualification was developed by the curriculum's authors and consisted of five factors:

- Conceptual backstory in voice prevention (module 1),
- Functional materials of speech training sessions for lecturers (module 2),
- Environmental factors that can influence the voice of teachers in school settings (module 3),
- Instructional competences (module 4)
- And quality management (module 5).

Lower Saxony/Germany began offering voice training sessions for teachers in April 2015, thanks to the expertise of the competent therapists. There were two types of seminars available: in-house trainings (in which all participants worked at the same school) and mixed trainings (which included teachers from various institutions) (participating teachers work in different schools). Trainers solely came to schools for the aim of providing training (Zamri et al., 2017). None of the competent SLPs is employed in a school setting. Each training session lasted two days in length (including 8 lessons lasting 1.5 hours each). It was decided to include in the study all voice training sessions that took place between March 2015 and December 2016. The survey tool was VPPV. It is a self-assessment tool to measure the subjective impact of voice

problems on professional speakers. The International Classification of Functioning, Disability, and Health is used to establish the theoretical framework for the VPPV (Solis-Soto et al., 2017). The questionnaire consists of 31 items separated into four components (physical capabilities, extracurricular, external factors, and individual factors). The questionnaire is administered online. The VPPV employs a one-to-five scale with the following denotations: one means never, two means seldom, three means occasionally, four means frequently, and five means always. The lowest possible point value is 31, and the greatest possible point value is 155. 750 professional speakers (teachers, educators, pastors, and contact center agents) from all throughout Germany were used to validate the instrument. The sample size was 750 people. The correlation between the VPPV and the Voice Handicap Index was used to check for construct validity (Meier & Beushausen, 2021). According to the findings of the VPPV, the voice training program has lowered the self-perceived voice impact among a substantial % of teachers who participated in the study. The training appears to be most helpful when it comes to improving physical function as well as involvement in activities. Moreover, environmental elements are a significant consideration for teachers, and they should be considered carefully in addition to the current voice training programs (Vilkman, 2004)

The findings indicate that the vast majority of teachers incorporate the contents of voice training sessions into their professional everyday lives, and that these behavioral changes result in increased vocal capacity and improved vocal performance in students. In particular, the findings of the VPPV show that the voice training program is beneficial in improving vocal performance (Sathyanarayan et al., 2019). The voice training sessions that have been conducted so far can be considered an important step in reducing the burdens associated with instructors' self-perceptions of voice impact in Lower Saxony/Germany. In Germany, findings are critical in demonstrating the benefits of preventative voice training programs to legislators, health insurance companies, and even teachers themselves (Manfred Nusseck et al., 2018). In order to

assess the effects of voice training on teachers' occupational everyday lives, factors were examined in particular:

- whether or not teachers applied material from the seminar into their everyday working lives,
- how often they applied which information and in which circumstances,
- how they rated the benefits of the training course for their occupational everyday lives,
- and how many days they missed from work in the three months prior to and following the seminar due to vocal problems

## **6.3 Adequate equipment supply**

### **6.3.1 Microphone**

Teachers who had vocal problems should use microphones in class, according to our findings, as compared to teachers who were not affected by the problem. This result was similar with the findings of Chen SH et al. One reason for this could be due to the benefits of this device, which include a reduction in the teacher's loudness, a reduction in phonatory effort, and an overall reduction in vocal load, all of which help to alleviate the bothersome vocal symptoms (Jannetts et al., 2019).

### **6.3.2 Reference microphone**

The reference microphone was a Neumann U89i (Georg Neumann GmbH, Berlin, Germany) with a hypercardioid polar pattern. With a frequency range of 20 Hz to 20 kHz and a frequency response that is flat from approximately 40 Hz to 15 kHz, this microphone is ideal for use in a variety of applications (Jannetts et al., 2019). With an equivalent noise level of 17 dBA and total harmonic distortion of 0.5 % at 134 dBSPL, it achieves an equivalent noise level of 17 dBA. Using Protocols LE version 8.0.3 on an iMac, the microphone was connected to an Avid Digi 003 audio interface (Avid Audio, Daly City, CA, USA) and the audio was recorded on the

computer (Avid Audio). The recordings were made at a sampling rate of 44.1 kHz and a resolution of 32 bits (Petrizzo & Popolo, 2021).

### **6.3.3 Amplification System**

It is recommended that excellent primary prevention be focused on three aspects: 1) Improving classroom acoustics, 2) developing voice care programs for future professional voice users, such as teachers, and 3) implementing classroom or portable amplification equipment are all possibilities (Bovo et al., 2013). Unfortunately, these interventions are only viable in limited circumstances due to a lack of financial resources and, in certain cases, because the problem is not given sufficient attention by school administrations and authorities. Intelligibility of speech and instructor voice demand are both adversely affected by noise and reverberation working together in a synergic method (Bovo et al., 2013). Particularly in day care centers and primary schools, the reverberation time frequently surpasses 1 second (the recommended reverberation time varies from 0.45 to 0.5 second) and the noise level reaches 55–60 decibels. New schools are intended to meet particular specifications, but acoustic conditions in ancient school buildings are typically very bad, according to several surveys conducted in all developed countries. Nonetheless, with the use of low-cost materials, it is now possible to improve the acoustics in a classroom (G et al., 2007). Wall absorber boards and an acoustic ceiling, in particular, can help to reduce reverberation time and sound level in the room. When reverberation times are fewer than 0.5 seconds, the fundamental sound pressure levels (SPL) in the classroom can be reduced by 8 decibels compared to when reverberation periods between 0.6 and 0.8 seconds are used. Aside from that, an effective speech amplification system can only be successfully installed in classrooms with appropriate reverberation periods, as previously stated (Bovo et al., 2013).

One specific treatment technique for reducing vibration dose is to give the teacher with an electronic voice amplification equipment for use in the classroom, which may be controlled



remotely. With lower loudness levels and hence lower vibration dose, it is anticipated that the degree of tissue injury caused by collision and shearing forces will be minimized, resulting in an improvement in voice quality and a reduction in vocal recovery times (Redman et al., 2020). Vocal amplifiers must be used at all times for safety reasons. There are various voice amplification systems accessible to teachers today, each with its own design, quality, and price that differs significantly from the others. For providing voice amplification in the classroom, two prominent options are sound-field frequency modulation (FM) systems (which use one or more strategically placed speakers) and portable personal voice amplifiers (Bovo et al., 2013). The cost of such systems varies significantly, and each system has its own set of pros and disadvantages that must be considered. Sound-field FM systems detect the speaker's voice by the use of an FM wireless microphone that is normally placed within 3 to 4 inches of the speaker's mouth, according to the manufacturer (Merrill et al., 2004). The speech of the speaker is transformed into an electrical signal, which is then broadcast to an FM receiver using an FM carrier frequency. After that, the signal is amplified, turned into an acoustic waveform, and broadcast to the audience over one or more loudspeakers, depending on the situation. Voice amplification happens solely in the classroom where the loudspeakers are situated when using stationary FM systems. Teachers, on the other hand, frequently utilize their voices in circumstances other than classroom instruction, such as the corridor, lunchroom, playground, gymnasium, and during other extracurricular activities, such as sports and music (RE et al., 2017).

#### **6.3.4 Using voice projector in the classroom**

With the introduction of modern technologies, today's classrooms have undergone significant transformation. In order to make the teaching and learning process more protracted and engaging, all of the latest technological equipment is utilized. Today, the majority of teachers and students are interested in incorporating multimedia projectors into their classrooms (G et

al., 2007). It is for these reasons that the multimedia projector is increasingly becoming the focal point of the advanced enhancement technology in the classroom, allowing students to learn in an effective manner. Students will no longer be required to congregate around a laptop or desktop computer monitor in order to view any multimedia presentations in the future. Just one projector can have a significant influence on each and every multimedia presentation, allowing students to be more dynamically engaged (Petruzzo & Popolo, 2021). In order for audience to understand and hear what is saying, voice projection is required. However, voice projection is much more than simply speaking loudly. Properly projecting voice can assist in maintaining the attention of the viewers and ensuring that message is more effectively received by them, all while increasing the confidence as a lecturer (Jannetts et al., 2019).

#### **6.4 Assessing voice health using smartphones**

Since the early 2000s, the concept of "mHealth," that is, the use of mobile phones to improve patient care in the health setting, has grown in popularity and importance. This is evident in the large number of health and fitness applications ("apps") that are currently available on the market. This includes new phone applications for voice analysis, which are now in development. When mobile technology is used, a big benefit is that it allows the patient to practice speech therapy at home, supporting patient-directed care, boosting their level of support outside the hospital environment, and ultimately lowering face-to-face clinician time and costs (Petruzzo & Popolo, 2021). It is essential that an application can function in field settings and give accurate data in order to be effective. Smart phones, which are becoming more portable than ever before, may be able to provide an additional alternative in clinical voice testing and therapy, making these services more accessible to people who suffer from voice problems. The current interest in smartphone applications, or apps, that assist healthcare providers in general, and voice clinicians in particular, served as the inspiration for this literature study. In order to achieve healthier voice production in the absence of a severe vocal

disorder, or to rehabilitate voice production following a dysphonic diagnosis with clinical intervention, voice clinicians can use smart phone apps to track the efficacy and compliance of their voice therapy treatments in their voice patients (Redman et al., 2020). Several researchers in the Communication Sciences and Disorders discipline, including the second author, have expressed an interest in the use of such apps, and researchers have recently published studies involving both commercially available and custom-made apps, as well as related equipment, for the gathering and processing of vocal information (Munnings, 2020).

Furthermore, there are some advantages to using mobile phone applications to assist in the management of speech pathology that should be considered. First and foremost, they offer the potential to expand the availability of auditory analysis tools, which is currently exclusively available through specialized voice clinics and laboratories. The portability of a mobile device is also an advantage: not only can voice clinic staff use it at the hospital, but so can laryngologists and other surgeons, who can use it to test their patients' voice quality on the wards, before and after surgery (Munier & Kinsella, 2008). Patients' ability to properly record their voice parameters at home has the potential to provide a more accurate objective assessment by increasing the number of samples needed to construct their "baseline," which could result in a more accurate objective assessment. Rather of relying on a couple of samples collected during a single clinic visit, the SLP can use a variety of assessments to guide treatment (Munnings, 2020). Furthermore, it has the potential to empower patients to take charge of their own voice rehabilitation, hence lowering the number of appointments required in follow-up clinics. As a result, costs for the hospital, as well as for the patient, could be reduced in terms of time away from work and travel expenses (Bovo et al., 2013).

Nowadays, quantitative auditory measurements are frequently gathered in a clinical context through the use of desktop computers, which can be expensive. As a result of the shift toward mobile health and the widespread use of smartphones in medicine, present techniques for

clinical voice assessment and treatment have the potential to be made more efficient and effective (Manfred Nusseck et al., 2018). Smartphones are more portable than the equipment used in most voice clinics and have the potential to expand the usability of clinical voice recordings and acoustic analysis software, according to the American Speech and Hearing Association. The usage of smartphone applications by patients outside of the clinic has the potential to provide a number of advantages. It allows patients to practice procedures at home and record themselves on a regular basis, boosting transfer (generalization) of therapy approaches outside of the clinical setting while also offering more information to track compliance, generalization, and progression (BE & A, 1998). In addition, clinicians will benefit from patient voice recordings because they will be able to collect more consistent data on their patients, allowing them to alter therapy techniques and dosages more quickly. Smartphones are being integrated into the field of health care at a faster rate than at any time in history. It is possible that as more and more members of the voice patient population acquire access to smartphones, these devices will become valuable instruments in the practice of voice assessment, therapy, and supervision (Ferreira et al., 2013). Mobile devices provide portability, allowing doctors to take voice analysis equipment to any location with relative ease. Aside from the clinical context, patients can keep track of their own development outside of the clinic and can share this information with their clinicians in order to improve therapy and confirm effectiveness. Nevertheless, there are still a number of obstacles to overcome before smartphones can be efficiently utilized for clinical and scientific reasons, including concerns about privacy and the creation of a robust procedure for mobile sound recording (Petruzzo & Popolo, 2021).

### **6.5 Seeking professional help and voice care**

When Voice Disorder is diagnosed, treatment should be provided, which may include a multidisciplinary team comprising of a physician, speech-language pathologist,

physiotherapist, psychologist, and occupational therapist among other professionals(NR, 2003). When analyzing VD, it is important to consider all of the factors that influence the professor's health state; if therapy is required, it should concentrate on changes in body, psychosocial, and personality characteristics, rather than solely on reducing the worker's occupational vocal load(de Medeiros et al., 2008). The therapy and rehabilitation program should be tailored to each individual instance in order to maximize the likelihood of a professor's health recovery. Obviously, treatment is dependent on the etiology that has been determined, with choices for medication or surgical treatment available. Any surgical procedure must be carried out if it is indicated (Moy et al., 2015). The majority of voice problems, on the other hand, can be treated without surgical intervention. Vocal speech therapy is frequently utilized in conjunction with other therapies, and this usually results in greater vocal adaption and a faster return of the worker to his or her previous work setting. Voice cleanliness and rest are frequently recommended in the context of acute dysphonia, according to conventional wisdom (Zamri et al., 2017).

**Vocal hygiene (vocal health):** In the field of vocal hygiene, there are a number of preventive and curative measures that can be taken. These include: receiving professional guidance on vocal function; refraining from smoking; abstaining from alcohol abuse; refraining from adopting poor body postures; treating infectious and allergic respiratory diseases; avoiding dry air environments; refraining from taking medications without a prescription; and engaging in physical activities(de Medeiros et al., 2008). The patient should always increase their water consumption by a sufficient amount, taking little sips at room temperature. Excessive consumption of dairy products should be avoided since these foods stimulate the formation of mucus in the vocal tract, causing it to thicken and become more difficult to remove. Lessons in singing are beneficial to voice professionals. An inactivity was indicated by nearly half of the instructors polled (46 %). Teachers who did not engage in physical activity had a higher

risk of likely dysphonia when compared to teachers who exercised three or more times a week, the findings showed (Temesgen et al., 2019). Despite the fact that this is a relatively new finding in epidemiological studies of voice, this finding highlights the need of encouraging instructors to exercise on a regular basis, both for the clinical rehabilitation of dysphonia and for the promotion of voice health. Physical activity is usually recommended for overall health as well as for producing a more resistant and energetic voice output. Factors such as intensity, duration, and kind of physical activity were not evaluated in this study, but they should be investigated in future studies (Thomas & Maruthy, 2020).

**Vocal rest:** Any sort of laryngitis need vocal rest, whether relative or absolute, which is critical. It should be recommended that the worker not only take a break from professional vocations, but also from social and recreational activities, as it is typically during social and recreational activities that the individual engages in the most outspoken abusive behavior(Przysiezny & Przysiezny, 2015). The vocal relaxation associated with time away from work can result in two situations that may be beneficial for people suffering from dysphonia. As a result of lessening the friction between the vocal folds, the first circumstance results in a noticeable reduction in inflammation. The second is related with the reduction of a possible situation of occupational stress, which might result in a reduction of contraction along with muscular relaxation, as described above(Zambon et al., 2014). The length of time spent resting varies depending on the etiology and other factors involved. In most cases, a work absence of no more than seven days is sufficient, because it is necessary to maintain a regular working schedule in order to promote adequate adaptation to real-world working conditions and to ensure effective therapy. It is normally recommended to avoid periods of more than seven to ten days of complete rest because of the risk of muscle atrophy. However, in some cases, complete rest may be necessary. Generally speaking, three days are sufficient. Because it is known that when the voice is adjusted, there is no impairment of the phonatory organ. If vocal hygiene and treatment are

followed properly, patients can continue their working practices during the treatment period without fear of worsening their condition (Moy et al., 2015)

### **6.6 Changes in vocal performance at follow-up**

Teachers who have been freed from a speech language pathology and audiology treatment program report long-term improvements in their quality of life and voice. Right after discharge and over a two-year follow-up period, vocal therapy for dysphonic instructors has a positive impact on the quality of life related with the voice of teachers (Mahmoudi et al., 2011). After an average of two years and two months of follow-up, the impact on the quality of life and voice of teachers who discontinued follow up their vocal condition becomes increasingly negative. After being discharged from treatment, it is critical that the patient retain the vocal pattern that was established during therapy, in order to be able to engage in social and professional activities such as teaching. In this way, maintaining appropriate vocal behavior is critical in order to avoid the development of new vocal disorders (Karjalainen et al., 2020). Following six months to two years of follow-up, individuals who have undergone speech treatment for dysphonia have demonstrated vocal stability, according to the published literature (Rossi-Barbosa et al., 2016).

However voice problems can be reduced after voice training programs. Here follow-up period after voice training is also very important. Here is a table 5 that describe the result of follow-up after voice training program (Meier & Beushausen, 2021).

|   |  |  |   |   |
|---|--|--|---|---|
| Since the voice training the trainers voice condition | Since the voice training condition of throat | Since the voice training the trainers facing discomfort symptoms (e.g. scratching or a lump in the throat) | Since the voice training the sound of trainers voice  | Since the voice training the trainers voice                 |
| Considerably more resilient 12.5% (n = 18)            | Considerably rarer 43.1% (n = 62)            | Considerably rarer 18.8% (n = 27)  | Considerably clearer 9.7% (n = 14)                    | Considerably more powerful 11.8% (n = 17)                   |
| Slightly more resilient 59.7% (n = 86)                | Slightly rarer 37.5% (n = 54)                | Slightly rarer 47.2% (n = 68)  | Slightly clearer 53.5% (n = 77)                       | Slightly more powerful 46.5% (n = 67)                       |
| As resilient as before 25.7% (n = 37)                 | As often as before 16% (n = 23)              | As often as before 28.5% (n = 41)  | As clear respectively hoarse as before 31.9% (n = 46) | As powerful respectively powerless as before 36.1% (n = 52) |
| Slightly less resilient 0.7% (n = 1)                  | Slightly more often 0%                       | Slightly more often 0.7% (n = 1)   | Slightly more hoarse 1.4% (n = 2)                     | Slightly more powerless 1.4% (n = 2)                        |



|   |                               |   |  |   |
|---|-------------------------------|---|--|---|
| Considerably less resilient<br>0.7% (n = 1) | Considerably more often<br>0% | Considerably more often<br>0.7% (n = 1) | Considerably more hoarse<br>0.7% (n = 1) | Considerably more powerless<br>0.7% (n = 1) |
|---|-------------------------------|---|--|---|

*Table 5: Changes in Vocal Performance at Follow-Up*

During a follow-up interview three months after receiving voice training, teachers were asked if their voice has altered since the seminar. The vast majority of teachers who were interviewed claimed that they were aware of such shifts (Table 5). They reported a slight or significant improvement in their vocal resilience (72.2 % of the respondents, n = 104), less frequent clearing of the throat (80.6 % of respondents, n = 116), and/or a reduction in symptoms of vocal tract discomfort (66.0% of respondents, n = 95). More than half of the teachers who were interviewed stated that their voice was slightly or significantly clearer (63.2 %, n = 91) and/or slightly or significantly more powerful (58.3 %, n = 84) as a result of the interview. Furthermore, 81.9 % (n = 118) of the teachers reported that the seminar provided them with knowledge about what to do if their voice is damaged by something (eg, in case of illness or overload). These findings indicate that the seminar provided a significant amount of good help to the professors (Meier & Beushausen, 2021).

## **Chapter 7**

### **Conclusion**

According to the findings of this study, reducing or eliminating risk factors for voice problems would most likely have a positive effect on the psychosocial well-being of teachers. Preventive voice care programs should therefore provide instructions for existing and future instructors in order to keep them from having voice difficulties in the first place(Alva et al., 2017). According to the conclusions of the study, the program's primary focus might be on the decrease or removal of the use of a loud voice in the classroom, among other things. For example, (1) an overview of why and how using a loud voice can be harmful (2) recognition of a loud voice (3) guidance in utilizing a resonant vocal technique to enhance one's voice with minimal effort and (4) the usage of a loudspeaker in the classroom is also discussed(Bermúdez De Alvear et al., 2011).

The findings indicate that the vast majority of teachers incorporate the contents of the voice training program into their professional everyday lives, and that these changes in behavior result in increased vocal capacity and improved vocal performance in the classroom(Smith E et al., 1997). Despite this, the number of teachers who have a mean value in the VPPV that can be classified as having a very high self-perceived voice impact, which indicates a risk for developing a voice disorder, is still significant after the voice training has been completed. This review paper developed some ways to aid in the reduction of voice abnormalities among instructors, taking the findings of this study into consideration: Vocal training, which will be provided to teachers as part of their ongoing professional development(Vilkman, 2004). This should include fundamental practices to ensure the most effective voice possible with the least amount of effort and strain. Use of microphones is strongly suggested since it decreases vocal

stress and ensures a comfortable level of sound, hence increasing the effectiveness of lectures. In addition, teachers are urged to consult with a doctor, if not on a regular basis, then at the very least anytime they have any vocal complaint in order to avoid irreversible damage to the vocal cords. Treatment of underlying conditions such as GERD, upper respiratory tract infections, and so on. Resting your voice is really necessary. Instructors are encouraged not to provide tutorials immediately following the conclusion of the day or to educate continuously without taking a break from teaching(Korn et al., 2016).

### **7.1 Limitations of the study**

Many etiology of the voice disorder was ambiguous and not proven properly. Hence; most are not explored in this study. Also, the effect of several other risk factors or disorders like Diseases such as Alzheimer diseases, osteoarthritis, and anorexia in instructors with vocal issues are still unknown. Based on the cross nature of the study, chronological association could not be determined. Because to the same issue, the source and impact could not be analyzed precisely. A large prospective study would help address these constraints. Secondly, perception of a loud voice was subjective. In order to establish a precise relationship, use of objective metrics is advocated. In this study proper follow-up techniques and methods are not described due to lack of data.

### **7.2 Future implications**

Voice abnormalities are associated with a high number of sick leaves, a high number of teachers quitting their jobs, and a high incidence of work-related disorders. In order to ensure their well-being in every aspect, it is critical to do everything to help them(Greve et al., 2019). The intervention reported in this study had a positive impact on the well-being of the participating instructors. Our understanding is that enhanced well-being promotes more effective communication in the classroom. Consequently, teachers' well-being is vital not only for the

individual teacher, but also for the student who are under their care. This form of intervention is relatively brief in duration, is cost effective, and can be tailored to the needs of individual schools. It is therefore recommended to schools as in-service training. At least in Sweden, teacher education programs frequently fail to provide adequate classroom communication instruction. As a result, it would be even more beneficial to incorporate equivalent training into teacher education from the beginning. Despite the fact that the therapy trial by Simberg et al. did not change the communication perspective, it demonstrated that group voice therapy is an effective approach of treating student teachers with modest voice abnormalities (Mahmoudi et al., 2011). At three months and one year following the intervention, there was a statistically significant decrease in the number of complaints of voice symptoms among students in the treatment group. This reinforces our opinion in the need of integrating communication training into teacher education programs. Future studies conducted as part of our study will look into the impacts of the intervention in greater depth. The acoustics of the classroom, potential changes in teachers' voice usage, and the impact of the intervention on students' well-being and self-efficacy will all be investigated in future studies (PG et al., 2006).

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