Voice Care For Student Teachers
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What You Will Learn Today

• Importance of voice
• How the voice works
• What is a voice problem
• Prevalence of voice problems and risk factors
• Signs and symptoms of vocal abuse
• How to maintain a healthy voice
• Sound amplification
• What to do if you have a voice problem
• Frequently Asked Questions

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You Are How You Sound!

- An essential tool of trade for teachers.
- 80% of our total image.
- Like a mirror that reflects our health, age, emotion and mood.
- The most expressive instrument in the world
- Adds meaning to speech by changes in pitch, rate and volume

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The Stats

- 7.5 million people have diseases or disorders of the voice.

- Teachers are 32 times more likely to report voice difficulties than the average person.

- As many as one-half of all teachers experience a voice disorder at some time in their careers.

- Teachers are 4% of the working population, but compose 20% of patients seen in voice clinics.

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Why Teachers Are Vocally Vulnerable

1. Heavy voice use
2. Limited recovery time
3. Exposure to germs and viruses
4. The need to raise vocal volume
5. Exposure to irritants
6. Poor acoustical conditions
7. Lack of training in healthy voice use

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Your Voice

- School teachers are one of the largest groups of *professional voice users* world-wide.
- **Voice = primary tool of trade**; main mode of communication in the classroom; one of your most powerful assets of professional voice users world-wide.
- Teaching places many demands on your voice. *Talking extensively, talking loudly, speaking over background noise, and speaking and projecting your voice over long distances are just some of the vocal pressures you confront every day.*
- Because of these vocal demands, teachers are at *increased risk* for developing voice problems.
- Fortunately, it is not difficult for most teachers to avoid voice problems and for you to have an effective voice for your entire teaching career and beyond.
Teaching Requires How Much Voice?

• Voice occurs 15% to 40% of the time during the teaching day
• Vocal folds vibrate more than 1,000,000 times per teaching day for female teachers & about half as much for men
• Obvious potential for phono-trauma (damage to the voice)
• Vocal changes, such as deterioration in vocal quality, can occur after 1-2 hours teaching – for example,
• Safe vocal performance time for reading aloud is estimated to be 35 minutes. (Titze, Svec & Popolo 2003)
The Teacher’s Voice

- Necessary to instruct, maintain discipline and provide encouragement and support
- Most teachers experience voice problems during their career
  - More likely to occur in early stages of career
  - More likely to affect female teachers

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The Teacher’s Voice

Teachers increasingly use technology in the classroom but natural tools -- their voices -- still get significant daily use.

The teacher's voice is perennially in danger and subject to deterioration in vocal quality; reasons for this include:

- failure to recognise the symptoms of vocal abuse and misuse
- lack of knowledge and awareness of the speaking voice
- the absence of preventative voice care
Why teachers are vocally vulnerable?

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Teaching –Vocally Demanding

• Teaching is a vocally demanding profession
• Demands long periods of speaking + environmental noise competing with your voice for the students’ attention, inadequate ventilation, few opportunities for resting the voice, extra vocal burdens such as tutoring, lunchroom monitoring, parent-teacher meetings + own personal vocal demands e.g socialising in noisy environments on the weekends.

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Why Voice Care?

- 20-25% of the Irish workforce use voice as a primary tool of trade.
- Teachers make up 5% of the Irish workforce yet they account for nearly 20% of patients seen at voice clinics.
- Recent epidemiological evidence has confirmed that voice disorders are a common occupational hazard of teachers, with 11% reporting a current voice disorder, and 58% experiencing a voice disorder during their career. Nelson (2005)

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Why The Concern?

- Speech induced voice loss parallels noise induced hearing loss
- Two unique organs where tissue is vibrated at high frequencies - the ear & the larynx
- Protection of the sounding mechanism, the larynx, is as vital, as protection of the hearing mechanism, the ear
- The primary concern - Prevention
Teachers Need Voice Training For The Sake of Pupils

• “The impaired voice seems to place additional demands on the listener as more resources are directed to perceptual processing, thus reducing processing capacity for the comprehension of information” Rogerson & Dodd 92005)
Speech understanding in younger children

- Auditory system still developing
  - Children’s auditory system not fully developed until late teens (± 15 yrs)
  - Children do not process sound as well as older children/adults

- Knowledge base of language not fully developed
  - Don’t have language skills/knowledge to fill in the missing pieces
  - Children rely more on “bottom-up” processing

- Younger children require better signal quality to understand speech well

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Double Jeopardy

An impaired voice may have a more detrimental effect on

– Children learning in non-native language
  • ESL, immersion
– Children with learning disabilities
– Children with behavioural, attentional difficulties
– Hard-of-hearing children (temporary, permanent)

• Cumulative effects?

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Teachers Are Professional Voice Users

Voice is an integral part of the role of your profession

• Requires considerable vocal stamina over prolonged periods & you have to make yourself heard by large groups of pupils

• Even low levels of vocal impairment -> not possible to adequately perform your job
Student Teachers

• Teachers who experience voice problems during their training also report more voice problems during their career.

  (Kooijman, et al., 2006).

• 52% of student teachers reported voice problems during the academic year (Miller & Sloane 2002). TDC study
Student Teachers & Voice Care

• On-going expressed need for preventative voice care programme for both teachers & student teachers.

• There is good news: 75% of teachers’ voice problems can be prevented or self-managed with the correct knowledge at hand.
Fundamentals of Voice Production

• Foundation for an effective voice is based on the co-ordination of three factors:

  - Breathing (fuel system)
  - Phonation (sound production)
  - Resonance (modification system)

• Breathing air out of the lungs provides the power supply for the voice
• The airflow from the lungs makes the vocal cords in the larynx (voice box) vibrate to make the basic sound for voice; this is called phonation.
• Because that sound made by the vocal cords is too weak to be heard, the basic sound is modified into the sound we recognise as the human voice, as it travels up from the larynx & through the throat. Mouth & nose; this transformation is called resonance.
• Production of a natural effective voice depends on how well we balance or coordinate these three fundamental components of breathing, phonation & resonance.

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Voice Production

• Voice production is dependent on the interrelationship of many different physiologic components.
• These voicing components include respiration (your breath or power generator), phonation (your larynx or sound source), and resonance (your throat, tongue, teeth, jaw, or the filter above the vocal folds), as well as the psychophysical components of pitch, loudness, and rate.
Breathing

- Intention to produce voice is signalled by impulses from the brain.
- The first response to these impulses is to take in enough air into our lungs to power the voice.
- For voice (speech) the breath is taken in through the mouth, passes down the trachea & into the lungs.
- For air to be inhaled into the lungs, the rib cage needs to expand and the diaphragm which form the base of the chest, needs to flatten from its dome shape; once the lungs reach capacity, the elastic tissue of the lungs recoil & the air is exhaled, up through the trachea & through the larynx where it starts to vibrate the vocal cords & thus produce sound.
- (So for speech breathing, most of the expansion should be in the lower rib cage area.)

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How The Voice Works

• The diaphragm and other thoracic muscles contract to move air in and out of the respiratory tract.

• Diaphragm: the muscle below the lungs that contracts and relaxes to inflate and deflate the lungs.

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How The Voice Works

During intake of breath prior to voice

• The vocal folds are open
• Air passes through unobstructed, to the lungs
During Voice.....

• The vocal folds are moved to the midline and pulled tightly as you breathe out.

• The ascending air pushes past the closed vocal folds, causing them to open and close rapidly (vibrate)→ = voice.
Voice Production

• Air pushes through the very small space between the vocal folds and in so doing, makes the covering of the vocal folds, known as the mucosa, vibrate.

• As air passes through a constriction created by the vocal folds, it speeds up and creates a suction in its wake. This suction draws in the pliable mucosa from each vocal fold, which meets in the midline, only to be pushed aside by more air from the lungs.

• This cycle creates a repeating undulation which is known as the mucosal wave.

• The regularity of the mucosal wave is essential to the production of good voice.
Voice Production
C. Resonators (e.g. neck/head cavities), that amplify the resulting sound

- The cavities of your head and neck act as resonators that determine the tone/quality of your voice.
- A good alignment of the head, neck and spine so that all channels are open;
  Keep up the pressure of breath from below;
- Aim to fill all cavities with sound on its way out; and
- Project the channel of sound through the mask/front of your face and forwards towards the listener.
Resonance

- The sound waves produced by the vocal folds in the larynx are too weak to be recognised as voice and so this basic tone must be amplified or resonated as it travels up through the spaces of the throat, mouth and nose.
- The shape, size and muscle tension of these spaces will determine the eventual sound of the voice we will hear.
- Because every person is built differently in the throat, mouth and nose, the basic voice tone is modified differently in each of us so that we will all have a recognisably unique timbre of voice.

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Resonance

• Resonance in the human voice gives us the ability to control its carrying power or projection.
• The main resonating cavities are a) the mouth b) the nose and in men c) the chest
• Size & shape of oral cavity changes by movement of lips, tongue, lower jaw & soft palate -> accordingly shapes sound into speech/words
• Clear speech -> relaxed jaw with good oral opening

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Loudness

- Loudness refers to how loud or soft a voice is.
- It is dependent on the amount of air pressure from the lungs and the muscle tension in the vocal folds.
- The greater the air pressure and the more tense the vocal folds, the louder the sound will be.
- The lower the air pressure from the lungs is and the slacker the vocal folds are, the softer the voice will be.
- We also use variations in loudness during speech to signal meaning and emotion and this is referred to as stress.

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Loudness is normally achieved by....

- Increased airflow from lungs
- Increased resistance to airflow by the vocal cords
- Increased sub-glottal air pressure (i.e., pressure of air travelling up the wind pipe under the vocal cords)
- Instead of increasing their air support from their lungs, teachers regularly raise their voices using laryngeal force -> hoarseness

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Loudness or intensity

- Normal adult larynx capable of generating a tone of 100dB at a distance of 1 meter from the mouth
- Normal conversational speech at usual distance from speaker to listener = 55dB
- Average classroom noise level? Average gym noise level?
- Speech to be heard by your pupils has to be +10dB > than ambient noise level
Pitch or Tone of your Voice

- Several factors determine the **pitch** of your voice;
- The length of the vocal folds
- Cross-sectional mass of the vocal folds
- The tension of the vocal cords
- Rate of vibration of the cords
- Inflamed cords eg due to a” head cold” or “night on the town” -> larger mass-> slower vibration -> deeper pitch voice

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INTONATION = varying the pitch

High Pitch →

The vocal folds are pulled more tightly to create higher pitches
• The vocal folds are loosened for lower pitches
• Involves increased movement of the laryngeal muscles and thus increases the physical stress placed on the vocal folds.

Low Pitch --→

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Quality

• Quality refers to how clear the voice sounds.
• Voice quality is determined by many complex factors including how relaxed the muscles of the larynx are, how moist the cover of the vocal folds is, how smoothly the vocal folds vibrate, and whether or not the vocal folds are able to close sufficiently during phonation.
• If the muscles of the larynx are excessively tense, the cover is dry, the folds move in an irregular way, and/or the folds cannot close together, the voice quality will sound rough, strained and/or breathy.

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What Is A Voice Problem?

• “Voice is a problem when the pitch, loudness or quality calls attention to itself rather than to what the speaker is saying. It is also a problem if the speaker experiences pain or discomfort when speaking or singing” ASHA, 2004)

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What Is A Voice Problem?

“Any time your voice doesn’t work, perform, or sound as you feel it normally should, so that it interferes with communication.”


• No fixed, uniform standard of abnormal voice exists just as no absolute criterion for normal voice can be established.
• Vocal standards are culturally based and environmentally determined.
• The definition of a voice as normal or abnormal depends on the orientation of the person making the judgement.

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How do you know when you have a voice problem?

- Has your voice become hoarse or raspy?
- Have you lost your ability to hit some high notes when singing?
- Does your voice suddenly sound deeper?
- Does your throat often feel raw, achy, or strained?
- Has it become an effort to talk?
- Do you find yourself repeatedly clearing your throat?
- If you answer "yes" to any of these questions, you may be experiencing a voice problem.

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Three Main Groups of Signs/Symptoms

- **Sensory or kinaesthetic symptoms** – sensory changes in your throat or throat discomfort
- **Visual Signs** – changes in vocal cord structure or function seen by ENT Consultant on laryngoscopic examination e.g vocal nodules
- **Auditory Symptoms**; changes in vocal quality such as hoarseness
Vocal Tract Discomfort

- Sensory changes in the throat are often present prior to or associated with changes in the sound of the voice, such as hoarseness.
- **Include**: Burning; Tickling; Increased Mucous or Phlegm; Feeling of Tightness/Constriction; Excess Dryness; Feeling of the need to clear the throat; Globus or feeling of a lump in the throat
Throat Discomfort Symptoms

- A feeling of fatigue
- • Dryness
- • Scratchiness or a tickling sensation
- • An ache, soreness or pain
- • A feeling of tightness or pressure
- • A feeling that talking is an effort
- • Shallow breathing
- • Sensation of a lump in the throat
- • Burning sensation
- Frequent need to clear the throat

- Later symptoms may be impairments of breath control, pitch, loudness, voice quality, and projection or resonance:

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Sensory Symptoms

- **Vocal tract discomfort** – changes in sensation in the vocal tract (mouth /throat) frequently accompanied by vocal quality changes
- **Soreness; burning; tickling; irritable; may hurt when you swallow; aching; constriction; effort to speak; lump/tightness in throat**
- **Increased secretions; feeling need to clear throat; mucous; catarrh**
Auditory Symptoms; Common Symptoms of Vocal Fatigue

- Vocal fatigue is a vocal loading borne change, manifested as physiological, perceptual, or subjective changes
  - Increased vocal effort
  - Reduced pitch range & flexibility
  - Reduced vocal projection (power)
  - Reduced control of vocal quality
  - Symptoms increase across the speaking day/teaching week
  - Improvement after resting

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Voice Disorders - Presentation

• Range from complete absence of voice (aphonia) to varying degrees of vocal impairment (dysphonia)
• May include, sensory symptoms (foreign sensations in throat/neck area), visual (visible on ENT examination) and/or auditory symptoms (change in your vocal quality)
Common Symptoms Of Voice Problems

- Breathiness & hoarseness of varying degrees (intermittent/constant)
- Deterioration in quality with use
- Inability to raise the voice/shout
- Reduction in speaking/singing range

- Inability to produce a clear easy voice without strain/discomfort
- Discomfort whilst speaking/following speaking e.g burning, tingling, dryness, tightness, pain in throat region
- Symptoms of vocal fatigue ranging from lack of ease in voicing to acute discomfort
Vocal Fatigue

• **Impaired vocal stamina** frequently experienced by student teachers.

• **Characterized by sense of increased effort** strain when talking/ decreased vocal capabilities e.g decreased loudness / quality.

• **There is a sense of needing to work harder to speak**

• **Vocal fatigue occurs when the vocal demands are greater than the individual’s ability to manage those demands**
Vocal Fatigue - Outcome

- When vocal fatigue occurs with increasing frequency, it can cause an individual to begin to use muscle activity strategies that promote unhealthy vocal fold tissues, leading to greater voice problems.
Vocal Fatigue – Take home message

- Vocal fatigue is self perceived and may not be heard as a change in the voice quality
- Occurs over time with vocal use
- Involves an increased sense of vocal effort
- Should be viewed as an issue of occupational safety & health
- Is affected by environmental factors
Common Voice Problems & Pathologies in Teachers

Some ‘visual‘ signs of a voice problem as viewed by the ENT Consultant

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Visual Signs

- Laryngeal pathologies caused by misuse and abuse of the voice include:-
  - Inflammation
  - Vocal nodules (nodes)
  - Oedema (swelling)
  - Vocal cord polyps
  - Contact ulcers/granuloma
  - Bowing of the cords
  - Non-specific laryngitis
Chronic Laryngitis
Vocal Nodules Resulting From Misuse & Abuse of The Voice

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Audible Clues for Potential Vocal Problems

• Breathiness
• Hoarseness; acute/gradual; persistent/episodic
• Dryness
• Pitch problems (voice has dropped in tone)
• Running out of breath
• Inability to sing especially at upper end of range
• Breaks in the voice (where they shouldn't be)
• Consistent aphonia (no voice)

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Early Warning Signals

All Teachers Should Be Aware Of The Following Early Warning Signals & Should Seek Referral If Any One Or A Number Occur

- Recurring loss/deterioration of the voice
- Diminution in range e.g inability to raise the voice with an accompanying increase in effort
- Pain/Discomfort in throat region
- A voice that does not return to normal following a cold

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Voice Disorder - Impact

- Normal voice is an essential part of communication and of the individual’s well-being
- Consider the effects on the individual
- Intelligibility
- Self-image
- Well-being
- Psychosocial effects
- Occupational consequences

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The main categories of causal and contributing factors are:

Voice use patterns
Voice production techniques
Health and stress patterns
Characteristics of the physical environment
Some Risk Factors for Voice Problem

- Medical + Non-Medical + Compensatory Mechanisms = Voice Disorder
- Interacting causes may include
- **Medical factors**, such as allergies, asthma, URTIs, endocrine/hormonal disorders, other underlying medical conditions, some medications
- **Psychological factors**, stress, anxiety
- **Environmental Factors**: adverse environmental conditions, air quality/temperature/dust/fumes/noise/poor room acoustics etc
- **Behavioural factors** – vocal abuse/misuse behaviours that you engage in, for example, achieving loudness incorrect/behaviours that compensate for voice problems.
- **All of the above can contribute and aggravate the voice disorder.**
Causes Of Voice Disorders

• Causes are frequently multiple and interactive
• Don’t forget –
• In addition to the manner & amount of voice use, the psyche has major input into voice problems
• The voice is a manifestation of the person’s overall state of well-being; anything and everything in the psyche or soma can alter a person’s voice, that is stress/ anxiety etc
Over Diagnosis of Vocal Misuse As Cause

- Although voice misuse or abuse is the most frequent cause of voice disorders in student teachers, the cause of voice problems in this population is NOT always to do with “how” they use their voice.
Factors that increase your risk of developing a voice problem

- Being female
- Being middle aged (40 – 59 years)
- First year of teaching & 16+ years of teaching
- Family history of voice disorders
- High workload and stress levels
- Composition of the class and large class numbers
- Acoustics, pool, gym, classroom, outdoors
- Longer classroom hours
- Underlying medical conditions eg. Reflux/hearing impairment, allergies, asthma etc
And Environmental & Behavioural Factors such as……..

• Poor acoustics of classroom / gym/pool area/laboratory -> unfavourable acoustic conditions

• Prolonged effortful and forceful voice use in an environment with a high level of background noise

• Prolonged voice use, especially in environmental conditions
Medical Risk Factors

- Vocal misuse
- Reflux
- Frequent coughing/throat clearing
- Upper respiratory tract infections
- Allergies/Sinusitis
- Certain medications
- Stress/tension/anxiety
- Alcohol/smoking/recreational drugs

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Risk Factor(s) Allergies

Allergies = abnormal immune responses
Symptoms = itching, eye redness and tearing, nasal blockage, and production of large quantities of clear mucus by the nose =/- voice problem.
Allergies And Respiratory Tract Infections- What To Do

- Restrict the amount of speaking you do when you have a throat infection
- Avoid all but essential talking, and avoid loud talking and speaking over background noise at work and at home when you have a throat infection
- Increase your water intake whenever you have hay fever or any infection of the respiratory system
- Avoid using medicated throat lozenges (use non-medicated lollies instead)
- Have steam inhalations once or twice each day to clear thick mucus and keep the vocal tract lubricated (there is no need for additives in the water)
Medical Risk Factors

• Allergies -> **swollen inflamed membranes.** (Dairy products may increase the viscosity of mucous produced (catarrh); inhale steam; keep up water levels; reduce intake of dairy products)

• **Dehydration;** A dry throat sound strained & lacking in resonance -> water

• **Medications;** Some drugs affect voice quality eg inhalants for asthma; anti-histamines; be wary of preparations that numb pain, e.g simple Strepsils
Medications

Consult your doctor if medications for any health condition seem to affect your voice or throat (it may be possible to use an alternative medication or to reduce the dosage)

Be wary of medications which contain anaesthetics to numb pain in the throat (because the effect may be to reduce your ability to detect when you are straining your voice e.g Strepsils)

Avoid frequent use of aspirin (because it can predispose you to vocal fold haemorrhage
Reflux

- Do not eat later than 2 hours prior to bed
- Avoid foods which promote reflux (e.g. alcohol, coffee, spicy and acidic foods)
- Raise the head of your bed at least 8 cm
- Take antacids or over-the-counter anti-reflux medications
- If the reflux is severe, consult your doctor for full diagnostic investigations and prescription of anti-reflux medications where appropriate

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Caffeine

- Limit your caffeine intake as much as possible
- Substitute water, herbal teas, juices for caffeinated drinks
- For every cup of caffeine you have, drink an additional two glasses of water
- Caffeine is a dehydrating agent
Other Physical Health Strategies

- Avoid foods which may make mucus secretions thick and sticky (e.g. full cream dairy products, highly spiced foods, nuts, chocolate)
- Try to breathe through your nose rather than your mouth (the nose warms and filters the air more effectively)
- Women may need to take extra care of their voices in the few days just before and at the beginning of the menstrual period (changes in oestrogen levels at this time may lead to swelling of the vocal folds)
- Avoid smoky environments (passive smoking can have similar effects on the vocal folds as smoking itself – less of a problem now)
Emotional Health

• Many types of stress and emotional reactions such as anxiety and depression can also have a negative effect on the voice.
• The areas of the brain responsible for the regulation of emotion are the same as those involved in voice production so that it is not surprising that a person’s emotional state is often reflected in their voice.
• When a person is feeling stressed; the muscles of the larynx and throat are often tensed.
• This excess tension in the larynx and throat leads to strained voice production, an increase in the effort required to produce voice and deterioration in voice quality.
Stress & Symptoms

- Headaches
- Sleep problems
- Ulcers
- Heartburn
- Indigestion
- Heart disease
- Raised BP
- Sexual problems

- Hoarseness
- Dry mouth/throat
- Weak voice
- Strained/strangled voice
- Aphonia (no voice)
- Monotone
- Tight feeling in throat
- Changes in pitch
Stress/Tension & The Voice

- Do you suffer from a dry mouth whilst teaching?
- Do you ever lose your voice completely?
- Does your voice sound strained whilst teaching?
- Do you suffer from tenderness in the jaw/ear/throat region?
- Do you suffer from shoulder/back of neck/upper chest ache?
Emotional Health

• An obvious way to maximise your emotional health is to work on reducing the stress levels associated with work and/or your life outside of work.

• Again, reducing stress and negative emotions is not easy without some assistance.

• Student teachers experiencing high stress levels should consider undertaking stress management or relaxation classes.
Stress & The Voice

• Avoid talking in a monotone voice
• Use pauses and inflections to gain attention and convey a message opposed to increasing volume
• Avoid starting words in a hard, harsh way – use easy starts
• Never clench your teeth or jaw to speak
  Avoid jutting your head forward whilst raising your voice
• Practise using your voice in a relaxed manner and transfer this technique to stressful situations

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Environmental Factors

- Open plan classrooms
- Areas with poor insulation from external noise (e.g. thin walls or partitions, poor fitting doors or windows)
- Environments with floor, wall or ceiling surfaces which cause sound reverberation (i.e., hard surfaces such as lino, ceramic or vinyl tiles, concrete, timber)
- Environments with high levels of background noise (internal or external)
- Outdoor settings
- Swimming pools
- Environments requiring you to talk or project your voice over large distances

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Environmental Factors

Classroom design; acoustic ergonomics

• Background noise (raising the pitch of the voice; using force/effort & shouting -> strain; avoid speaking for long periods in noisy conditions; remove/reduce noise; use controlled delivery)

• Ideal Listening/Speaking Environment
  - Teacher’s voice is clearly audible
  - Little background noise
  - Good room acoustics
    – Good attenuation of sound from outside noise sources
    – Reverberation (“echo”) in the classroom
      • Not too little, not too much

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Environmental Risk Factors

• **Humidity and temperature** Low humidity, particularly prevalent in winter, is bad for the vocal cords and leads to an increased risk of throat irritation and infections.

• **Air quality** Poor workplace air can cause irritation - mould spores in damp environments, airborne dusts like glass fibre, aluminium, wood dust, silica, lime, chemical fumes & odours,’ chlorine, nitrogen oxides, aromatic nitro-compounds, organic solvents, bitumen fumes - can affect the voice.
Environmental Factors

- Hydration; internal/external; Hot dry atmospheres & central heating dry out mucous membranes (humidify classroom; ventilate; drink water)
- Irritants, chemicals, odours, dust, chalk, fumes, perfumes, chlorine, some solvent based glues are irritants -> mucous membranes of vf become dry & inflamed
- Classroom infections

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Maximising The Physical Environment

- Some environmental conditions may also have a direct impact on the health of the vocal folds and larynx.
  - Very dry air (e.g. air conditioned environments)
  - Dusty environments/polluted air
  - Fumes from paint, chemicals, solvents, chlorine, felt-tip pens and markers
  - Smoky environments
  - High levels of plant pollens

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Maximising The Physical Environment

• Any of these conditions may lead to inflammation and swelling of the vocal folds and laryngeal mucous membranes, excessive coughing and throat clearing and production of thick mucous which collects on the vocal folds.

• It is also possible that some of these environmental factors such as plant pollens, chemicals and pollution cause allergic responses of the respiratory system that in turn may adversely affect the larynx and vocal folds.

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Maximising The Physical Environment

Teachers will need to develop self-management strategies that minimise the effects of sub-optimal environments and to work with the school management group to improve the physical characteristics of the school/work setting.

Remember that with effective voice production techniques and good voice care, it is possible to minimise the impact of poor environmental conditions.
And…

- Excessive talking at loud levels
- Incorrect use of voice
- Screaming and yelling at high pitches
Classroom Noise

- Speech to be understood must be at least 6db greater than ambient noise level
- Average noise of a classroom = 85dB
- Shouting -> excessive laryngeal tension -> irritation of the vocal cords -> pathological changes such as vocal nodules
- Many teachers increase the loudness of their voices by increasing tension at the level of the larynx rather than by air from the respiratory system

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Decibel level of common sounds

<table>
<thead>
<tr>
<th>Sound sources</th>
<th>SPL (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faintest audible sound</td>
<td>0</td>
</tr>
<tr>
<td>Whisper</td>
<td>20</td>
</tr>
<tr>
<td>Quiet residence</td>
<td>30</td>
</tr>
<tr>
<td>Soft stereo in residence</td>
<td>40</td>
</tr>
<tr>
<td>Speech range</td>
<td>50-70</td>
</tr>
<tr>
<td>Cafeteria</td>
<td>80</td>
</tr>
<tr>
<td><strong>Classroom</strong></td>
<td><strong>85</strong></td>
</tr>
<tr>
<td><strong>P.E. class</strong></td>
<td><strong>90</strong></td>
</tr>
<tr>
<td>Accelerating motorcycle</td>
<td>100</td>
</tr>
<tr>
<td>Rock concert</td>
<td>120</td>
</tr>
</tbody>
</table>

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Sources of Noise

• **Outside noise sources**
  – Fellow pupils
  – Environmental sources of noise eg traffic

• **Inside sources:**
  – Student activity
  – Equipment: computers, projectors
  – Reverberation (echo) of sound within the room
  – Neighboring classrooms
  – Ventilation and heating systems
Shouting/Loud Voice

- Teacher’s voice (signal) = 60 dBA
- Background noise = 45 dBA
- SNR = 60-45 = +15 dB
- Speech to be understood has to be at least 10 dB greater than ambient noise level

• Increasing the volume of the voice involves expelling the air with greater force so as to make the vocal folds vibrate more vigorously.
• Similar to how a guitar string sounds louder when it is plucked more forcefully
• Prolonged yelling causes the vocal fold tissues to become irritated because they are hitting against each other more violently than normal
Behavioural & Psychological Risk Factors

- Vocal loading, that is, the amount & nature of voice use (nature more important than amount)
- Lack of recovery time
- Poor tissue environment
- Poor vocal efficiency
- Mental health (stress/tiredness)
Behavioural Risk Factors: Vocal Abuse & Misuse

**Vocal abuse** is any behaviour or occurrence that strains or injures the vocal folds (or vocal cords).

**Vocal misuse** is improper voice usage such as achieving loudness incorrectly or at an abnormally high or low pitch.

Frequent vocal abuse and misuse can damage the vocal folds and cause temporary or permanent changes in vocal function, voice quality, and possible loss of voice.

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What Constitutes Vocal Misuse

The most common vocal misuse behaviours are:
Speaking or singing with excess loudness levels
Speaking or singing with excessively low or high pitch levels
Speaking or singing with excessive muscle tension in the larynx, throat, jaw, tongue and neck
Speaking with hard glottal attacks - abrupt and forceful beginnings to the first sounds in words
• Crying, laughing and sneezing with excessive muscle tension in the larynx, throat, jaw, tongue and neck
• Shouting, yelling, and screaming
• Coughing or clearing the throat excessively
• Speaking or singing extensively during a throat infection

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What Constitutes Vocal Misuse

Producing voice during effort closure of the vocal folds in non-speaking activities (e.g., weight lifting, sit ups, tennis, etc)

Whispering or speaking in an excessively breathy or airy voice

Whether or not these behaviours will lead to voice problems depends on the frequency and severity of the vocal misuse.

It is also important to keep in mind that individuals vary widely in their susceptibility to vocal misuse. A vocal behaviour that causes a voice problem in one person may have little or no adverse affect on another.
Vocal Misuse

• There are many situations faced regularly by student teachers that are conducive to these vocal misuse behaviours.
  • Speaking or singing over background noise
  • Speaking loudly to attract student’s attention or to discipline students
  • Speaking over large distances without effective amplification
  • Speaking to large groups without effective amplification

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Vocal Abuse

• yelling and screaming
• speaking against a background of loud noise such as the classroom/gym hall etc
• coughing and excessive throat clearing
• excessive talking or singing while having an allergy or upper respiratory infection (cold)

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Acoustic characteristics of the ideal speaking/listening environment

- Recommended noise level of unoccupied classroom:
  - ANSI S12.60: 35 dB

- Teacher’s voice (relaxed)
  - 60 dB

Noise, reverberation time & estimated speech intelligibility, in most occupied classrooms are unacceptable (ASHA, 1990; Pekkarinen & Viljanen, 1990)
Impact of poor acoustic environment on teachers’ voices

- Teachers must adjust voices to be audible above background noise > 40 dB
- Vocal adjustments contribute to increased vocal fatigue/strain
- Teachers with occupational voice problems
  - Teacher’s voice quality and therefore the speech signal are compromised, resulting in a poorer student performance
  - Many teachers achieve loudness at the ‘laryngeal’ level instead of increasing their breath support

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Reducing The Harmful Effects of Vocal Misuse

Sip water frequently all day to keep your larynx and vocal tract moist (one to two litres of water sipped during the day is sufficient)

Massage under the chin to increase saliva flow and keep the larynx and vocal tract moist

Have steam inhalations (no additives needed) to clear mucous and keep the vocal tract lubricated (once or twice a day for one minute is ample)

Plan balanced voice use during a day by organising activities where speaking is not involved. Include a period of at least 30 minutes during the teaching day where you can work or relax in a quiet place without talking at all

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To Prevent Vocal Strain

- Turn down, shut out or move away from noise in the environment whilst talking
- Use gesture/non-vocal signals to gain attention
- Talk to groups/classes whilst students are quiet
- Stand in a place in the room/gym/pool area, that will make it easier for students to hear you
- Move close to students when talking
- Avoid other activity whilst instructing e.g. lifting/pulling/pushing or demonstrating an exercise./routine – talk first then demonstrate!
- Do not ‘talk and chalk’!
To Prevent Vocal Strain

• Use routines to gain attention or signal changes in activity
• Arrange the classroom so that students who are noisy or need extra attention are in front or that you are nearer pupils that require extra attention/supervision
• Speak slowly and with sufficient breath support
• Plan your day so that you build in periods of vocal rest

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To prevent Vocal Strain

• Avoid talking over long distances; conversational distance = 3 feet.
• Avoid shouting to discipline students
• Avoid clearing your throat or coughing habitually
• Avoid speaking to large groups without a microphone
• Avoid nervous habits when speaking to the class eg. throat clearing, talking with insufficient breath support
• Avoid yelling or speaking during strenuous exercise

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To Prevent Vocal Strain

- Use methods to attract students’ attention such as bells, whistles or gesture
- Reduce the amount of speaking during teaching – give instructions to small groups of students
- Avoid instruction when you have a cold
- Limit use of character voices
- Learn to project your voice without tension and strain

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Tips For Teachers

• Teaching/discipline styles that allow maintenance of normal loudness level & tone of voice
• Do not speak over excessive background noise
• Request support from principal to minimise ambient noises. Foster a “quiet” room
• Position yourself in front of classroom. Remind pupils to wait/catch/listen
• Colds/other illnesses -> plan alternative educational activities

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Tips For Teachers

• Enlist pupils in your voice care plan – “friendly reminders” throughout day!
• Drink water frequently: 8-10 glasses per day. Avoid caffeine/other diuretics
• Build in small “recovery breaks”
• Watch posture; no rounded shoulders/folded arms; talking whist bending over desks; head should not be forward from spine; no speaking with head lowered/twisted

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Further Tips

• In managing your voice & delivery consider:
• Best location to be seen
• Best group arrangements for tasks /acoustics/getting attention
• The effect of tone of voice
• How voice creates a relationship with the listeners
• Find energy in words – make pauses work for you i.e allow pause and silence reinforce meaning
• Plan a time during the day – even if brief-when you rest your voice from speaking
Other Voice Care tips

• Avoid smoking/passive or otherwise
• Avoid chemical irritants (chalk dust/photocopiers/markers/laboratory fumes/chemicals)
• Avoid neat alcohol e.g. shots.
• Avoid mouthwashes containing alcohol
• Medications

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Improve Physical Environment

• Make sure you are close to students when you are talking to them
• Arrange classroom furniture so that there is minimal distance between yourself and the students
• Position yourself in the room where you have eye contact with all students
• Do not stand with window behind you
Improve Physical Environment

• Close the doors and windows to prevent external noise

• Reduce background noise
  – turn down TV, radio or music when addressing the class

• Speak to class when they are relatively quiet

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Environmental Irritants

- Large spaces can create echoes. In these surroundings talk slowly with clear pronunciation rather than increasing volume.
- Avoid fumes, dusty or dry environments as these are allergens and can irritate your throat. E.g., Chalk/Markers/Newly painted classrooms/Central Heating.
Classroom Environment

- Classroom environment = Poor vocal tract tissue environment
  - Dehydration (self & classroom environment)
  - Smoke
  - Chemicals, (photocopier fumes, magic markers, glue)
  - Pollens, Chalk Dust, etc
  - Drugs; medication; general health e.g URTIs
Voice Care

- Spicy foods; dairy products
- Voice is closely linked with emotion. Stress will reflect in your voice
- Voice needs moisture; water intake; diuretics; medications; atmosphere
- If voice is hoarse do not try to whisper/continue to talk -> rest voice
- Be aware of vocal quality changes; monitor & see doctor if there is a persistent change
Improve Physical health & well being

• Sip water throughout the day to hydrate vocal folds.
• You should have 6-8 glasses of water a day.
• Avoid smoking, alcohol and caffeine as this dries the vocal folds and causes swelling.
• Avoid menthol based throat lozenges as they dry out the lining of the throat.

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And…..

• Never teach/instruct if you have a throat infection
• Manage reflux appropriately
• Allow for periods of voice rest throughout the day – arrange session plans accordingly
• Try to breathe through your nose rather than your mouth as it humidifies air more effectively
• Maintain a healthy lifestyle, get sufficient sleep, eat a balanced diet and exercise regularly
Things Which Can Cause Problems in the Larynx

- Cigarette smoking & other drugs
- Medications such as antihistamines, aspirin, diuretics and anything which blunts perception (alcohol, valium); thyroid drugs; oestrogen containing drugs; hypertension drugs; steroids
- Asthma medication
- Throat lozenges; mouth washes etc
Other physical factors influencing voice

While breathing, phonation and resonance are the basic building blocks of the voice, the effectiveness of our voices is also affected by:

- Body Posture
- Relaxation of the muscles of the head & neck area

**Posture:** Because the parts of the body which contribute to voice production are connected to many other parts of the body’s muscular and skeletal system, the way we align the whole body and the amount of muscle tension or relaxation in the body will influence the voice. **Excess tension** in the muscles of the larynx, for example, can lead to a strained, **harsh voice.** Similarly standing with the shoulders rounded and the head jutted forward from the spine can lead to difficulty in coordinating relaxed breathing with voice.

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The Teacher & Posture

• What is good posture?
• What is your typical posture in the classroom?
• Teaching and common posture problems
• Chalk & talk; folded arms; head lowered; rounded shoulders; raised shoulders; head lowered whilst reading etc
Poor Posture

Poor Posture = Tension = Impacts voice

• Face your body towards the class
• Don’t slump – remain upright
• Remain relaxed

• Chalk & Talk X
• Avoid bending over pupils’ desks
• Avoid folding your arms
• Avoid reading from text with your head lowered

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Posture. Do.......

Align the head with your spine (ears over shoulders)
Keep posture symmetrical
  Balance your weight evenly when standing
Keep arms relaxed
Keep the shoulders level and relaxed and in a slightly forward-sloping position
Keep knee joints loose and legs relaxed
Keep the feet directed forward and approximately 20 cm apart where possible
Keep the rib cage relaxed and lifted
Keep the shoulders relaxed and lowered

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Posture. Don’t……

Thrust the chin forward or up
Throw the head back
Clench the teeth or have upper /lower teeth touching
Push the tongue against the teeth
Round the shoulders
Slump the spine
Lean excessively forwards or side-wards
Hold a rigid posture
Lock the knees
Keep thigh muscles braced
Raise or hunch the shoulders
Jut your head forward

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Breath Control Symptoms

- Audible inspiration or ‘gasping’ on inspiration
- Running out of air on a sentence
- Shallow breathing
- Raising /lowering the shoulders on inspiration/expiration
Breathing For Speech

• Do you use the wrong place of breathing?
• Does your upper chest area move forward on each breath?
• Do your shoulders rise slightly?
• Do you run out of air whilst talking?
• Does your throat hurt whilst talking loudly?
• Does your voice drop off towards the end of a phrase
Breathing For Voice

- Efficient breathing for voice production is characterised by the following features:
- Silent oral inspiration of air
- Quick oral inspiration and slow exhalation of air in a rhythmic pattern
- Relaxation and expansion of the lower ribs and lower chest area on inspiration of air
- Little or no movement of the upper chest and shoulders on inspiration of air
- A focus on exhalation of air rather than on inspiration so that inspiration is automatic and relaxed
Breathing For Voice

- Release of breath either simultaneously with or just before the onset of voice - not too early or too late
- Pausing as soon as there are signs that you are about to run out of breath so that inspiration of air will occur automatically for the next phrase
- Regulation of breath supply to coordinate with the length of phrases – take sufficient air in for the amount you wish to say in each utterance
Breathing

- Keep your shoulders and upper chest relaxed during speech
- Focus on co-ordinating your breath with your speech
- Speak slowly, pausing often at natural phrase boundaries, to allow the replenishment of breath
- Avoid squeezing out the last few words without sufficient breath.
- Breath from your diaphragm rather than using your upper chest as this is a more efficient way of breathing
Amplification

- Various options and price ranges
- Portable and stationary sets available
- Light and compact
- Can be used outside the classroom

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Amplification Systems

• Some schools have these facilities available to meet the needs of children with hearing impairment
• Improves listening conditions by increasing loudness of teacher’s voice as compared to background noise levels and provide constant signal regardless of teacher’s position in the classroom
• Consists of microphone and transmitter which are worn by teacher, and a receiver/amplifier and speakers which produces the teacher’s voice evenly throughout classroom
• Students benefit as able to hear teacher more clearly, so less distracted and better behaviour
• Teachers benefit as don’t have to raise their voice, so less physical effort required and less work for voice

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Amplification

- Soundfield Amplification Systems (SAS)
- Personal Voice Amplifiers

Who will benefit?
- Useful for anyone with a weak voice or voice problems
- Useful preventative measure as less shouting and voice strain
- Rests the larynx to allow healing and avoid further damage
- Minimises overall strain and fatigue when physical environment or health makes talking an effort
- Students are better at listening & understanding

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Professional Help For Voice Problems

“ My voice is still bad so what do I do now?”
Identifying When Medical Advice Is Needed

- Regular/unexplained voice loss
- A change in voice quality for > 10 days
- A weak & tired sounding voice
- A voice/throat that feels consistently painful/ sore/tickly/dry
- Frequent throat clearing
- Loss of vocal power or ability to project

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Red Flag!

• If voice symptoms persist for more than two or three weeks after a cold or flu has gone away – especially if you are a smoker – an ear, nose, and throat specialist (ENT Surgeon) should be consulted right away.

• Even if your voice has been hoarse since childhood, hoarseness – or any other voice complaint – should be evaluated by an otolaryngologist or laryngologist.

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Management

• Teachers with dysphonia or hoarseness are best managed by a team consisting of a laryngologist (ENT Specialist) and a speech & language therapist
• Any person who has been hoarse longer than two weeks deserves a careful inspection of the larynx
• Hoarseness due to chronic laryngitis is due to irritation/trauma of the mucosal covering of the vocal cords. It is not to be confused with acute infective laryngitis that is a direct result of a viral infection

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Management

- Medical intervention in the form of antibiotics, cortisone, sprays, steam & lozenges is inappropriate.
- Periods of voice rest are purely palliative & hoarseness will return.
- Hoarseness due to abuse & misuse can be alleviated through voice therapy.
- The prognosis for return to normal voice is excellent in most cases.

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Vocal Health

- A return to vocal health depends on a number of elements;
- Engagement in voice therapy
- The state of the vocal tissues,
- Amount & nature of voice use.
- This invariably means CHANGE in what we think and what we do and it is artificial to separate the two.
Resources

Websites For More Information

- [http://www.voicemedicine.com/](http://www.voicemedicine.com/) - Information about specific voice disorders and treatment
- [http://www.voicedoctor.net/](http://www.voicedoctor.net/) - Medically based information on voice disorders
- [http://www.nyee.edu/cfv.html](http://www.nyee.edu/cfv.html) - The voice and swallowing institute. Information on voice therapy and amplification for teachers.