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Hearing the Teaching Voice: Improving Instructional Communication

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Abstract: Post-secondary instruction is absorbing a variety of technological aids to learning, but it still depends to a large degree on lectures, which are in turn dependent on essential patterns of communication: a speaker conveys information by voice, and listeners receive and interpret what is said. While considerable attention is given to the design of university classrooms in terms of physical space and visual accessibility, far less is given to acoustics and to the realities of classroom soundscapes. Instructors in large classrooms routinely compete with the roar of ventilation systems and projectors, as well as the buzz of lights and flurries of clicking from student laptops. For those without skill in vocal projection, lecturing can lead to vocal fatigue; for students it can lead to frustration as important information is missed because ambient mechanical roars obscure the lecturer's voice. While audibility can be enhanced with mechanical amplification, it adds a sense of distance between speaker and listeners that may diminish student engagement. Thus, further attention to the impact of spoken communication in the classroom is warranted.

"Noise interference with speech comprehension results in a large number of personal disabilities, handicaps and behavioral changes. Problems with concentration, fatigue, uncertainty and lack of self-confidence, irritation, misunderstandings, decreased working capacity, problems in human relations, and a number of stress reactions have all been identified."

(World Health Organization Guidelines 3.2)

Post-secondary teaching is distinguished from the instruction of children and teens by a long list of factors: the age and consequent abilities of the students, the focus of instruction, the amount of education required by instructors, the cognitive tasks involved, and many other variables. Caught up in the concept of "higher education", we sometimes miss the commonality of instruction regardless of age and level: that it consists largely of information being conveyed by speech to listeners. Instruction can include visual imagery and haptic experience, but it rarely involves silence.

I teach Acoustic Communication, which is about auditory technologies like radio and telephones, but also about human speech and song, the most ancient and fundamental ways of conveying information. The field has a loose taxonomy and a lot of permeable boundaries.[1] The first boundary that you're encouraged to cross is the one between speech and writing. The human brain has an amazing number of feedback loops between vision and hearing, which is why our species developed the ability to read and write. Instruction at the post-secondary level often comes in written form, but writing is based in speech, and its interpretation normally requires familiarity with a spectrum of sound.[2] Rhetoric became a foundation for instructional writing only after several centuries of use in oration.[3]

Even the forms that instructional writing takes today are usually based on the spoken forms of instruction : narrative, lecture, Socratic dialogue, and discussion. Every time we read, we are activating auditory memory: the wall between listening and reading is more paper than stone, and the way that professional writers talk about "voice" and "audience" suggests that they regard themselves as speaking to listeners through the medium of print.

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1 For example, does texting resemble writing or speech?

2 Deaf children learning to read are taught tactile signals through signing or fingerspelling that are processed in the brain as mapping to written words in the same way as auditory signals – but it's a more complex and slower process.

3 For a history of literacy, see the work of Walter Ong.

So do we, as conveyors of knowledge. The link between speaker and listener is fundamental to learning in a variety of ways. We learn as small children to copy our parents' speech and usually acquire their accents. We learn to read by internalizing speech, by thinking in words. We attend school and get told what we need to learn and how to go about it; we attend university and gain information by experiencing a pattern of instruction in which an expert conveys information laden with significance to us, and we then question or challenge the expert in order to gain further clarification. Both formal lectures and flipped classrooms involve speech: so do virtual classrooms. Whether the speaker (who may be a teacher or a student) is present in the classroom or on a screen, we form a relationship of trust or skepticism based partly on the content of what is said, but also on the speaker's *voice.* Human hearing is exquisitely tuned to detecting emotional nuance in speech, which is why radio never got entirely supplanted by tv.

The bond between speaker and listener is important. Every student you encounter has at some point learned from listening to other people speaking directly to her or him, and carries that experience into your classroom. Setting technology aside for the moment, let's consider the auditory elements of the instructional soundscape: speaking, hearing, listening and noise.

Okay, what's a soundscape? It's a term from the field of Acoustic Ecology, the study of auditory environments and how they affect us. Hearing and listening were mentioned separately because they are different: listening requires attention. And what about noise as a factor in instruction? Take a moment to close your eyes and listen to a classroom – how many sources of sound can you identify?

A mechanical soundscape is part of every classroom in a building with a sealed ventilation system: you're hearing the air-conditioning system along with the projector and the computer fans. If all of that were turned off, the high-pitched hum of the lights would still impinge on the silence that you think is there. Then add the clacking of keyboards, shuffling of feet, the occasional coughing fit and that pair at

the back of the room who keep whispering about whatever they're watching on YouTube during your class. The result is called *masking*: it's when one acoustic signal effectively hides or scrambles another. It means that what you're saying isn't necessarily reaching everyone in the room because the reception depends on where they're sitting in relation to the air vents, the projector, and each other – and, because hearing and listening are different skills, that's independent of whether they're paying attention.

There is an extensive literature – thousands of entries – on room acoustics in elementary schools, and quite a bit on high school classroom design. Most of it points out examples of poor design and what results from it. For example, a pamphlet produced by the Technical Committee on Architectural Acoustics of the Acoustical Society of America in 2000 warned that many U.S. classrooms had a speech-intelligibility rating of only 75%. This meant that a child in the middle grades with average, unimpaired hearing and full fluency in English was missing every fourth word spoken in the room (*Seep 2000*).4 Children with English as a second or subsequent language and those with any degree of hearing impairment --whether genetic, congenital or resulting from temporary ear infections – could be expected to miss even more of the content of spoken information and instructions.

Most of the literature on classroom design relates either to early childhood acquisition of reading skills or to enhancing the success of students from immigrant families who are encountering new languages at school, and of students who have impaired hearing. Relatively little research has been done on university campuses, partly because it's assumed that students are already proficient in the necessary skills. But let's backtrack a moment to that last category: students with impaired hearing. It's not a large segment of the population aged 18-25 --- *or is it*?

In 2002 the U.S. Centers for Disease Control and the U.S. Association of School Nurses estimated that

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4 The *Classroom Noise Booklet* is an excellent layperson's guide to acoustics, how sound functions in architectural spaces, and why it matters. It is available as a.pdf file from the Acoustical Society of America website: *http://asa.aip.org*

12.5 % of American children under the age of 17 had some degree of noise-induced hearing loss caused by recreational devices and activities: personal music players, mechanical toys, snowmobiles, rock concerts and raves. This is still the official estimate of Noise-induced Hearing Loss in U.S. children and teens (*Niskar 2001*), but the number is based on a study completed in 1994 and published in 2001, well before the widespread use of MP3 players and changes in the technology of amplifiers for music. A more recent – but still outdated – study done in Canada found that 25% of young people entering the workforce in 2005 had "the early warning signs of hearing loss, with a further 4.6% clearly showing abnormal results on hearing tests" (*The Hearing Foundation of Canada, 2005*). This was before personal music devices with earbuds were used as extensively as they are now, and before the amplifiers at rock concerts routinely produced loudness levels over 100 decibels – equivalent to a leaf-blower or snowmobile – which cause damage to hearing acuity in a matter of minutes.

Whether it comes from earbuds or concerts, recreational listening habits are causing hearing loss in a significant number of young adults.5 The frequency spectrum most likely to be affected is exactly the range of speech. This means that a significant minority of our students are hearing blunted consonants or continuous ringing in their ears – a condition called tinnitus, which is common in the early stages of noise-induced hearing loss -- when in class. Unless tinnitus is present, they're usually completely unaware that their hearing is compromised.

Which brings us back to the teaching voice. As professional communicators, what are we to do? We can't retrofit classrooms or cure noise-induced hearing loss. We *can* be more aware of using our voices effectively. Here's an example:

Imagine that you're the student attending a lecture with information crucial to your career. The instructor is tired, and so are you. The instructor's voice is muted, hard to hear, and not very interesting

5 I am currently finishing the manuscript for a book on the effects of noise on health: two chapters focus specifically on children and teens.

because there is no variation in tone – nothing to startle the auditory system into renewed alertness. The roar of the classroom machinery easily masks the sound, and crucial information is lost.
Next, consider a voice that is well projected and enthusiastic, conveying the instructor's fascination with the subject and enthusiasm for sharing its secrets: would your own enthusiasm and ability to retain information be affected?

Now consider your own voice: is it relaxed and confident or tense and hesitant? Well articulated or difficult to understand? Energetic and enthusiastic or tired and bored?

Considering such contrasts gives the first clue to improving the teaching voice: listening. Record yourself lecturing, just briefly, and listen with a student's ears. Are you speaking too slowly to convey excitement about your subject? Too quickly for students who are not entirely fluent in English to follow you? Too softly to be heard, or so loudly that those in the front row might want to cringe?

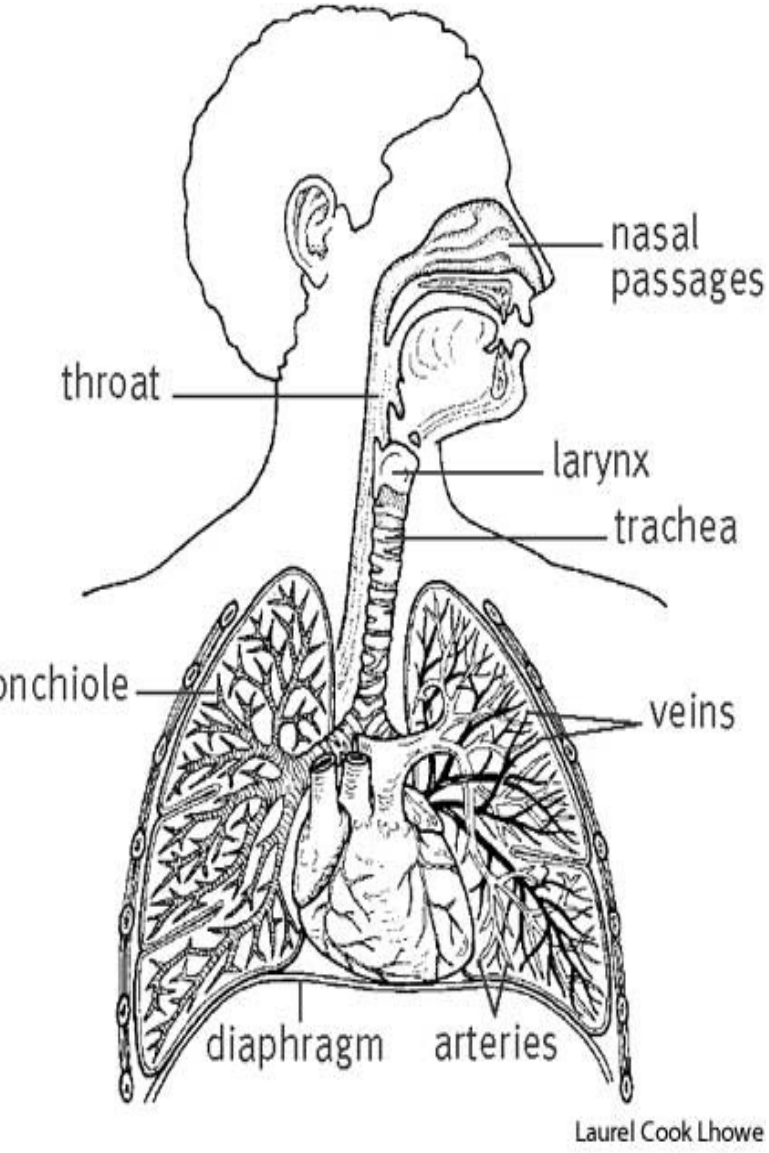
And what about nerves, especially if you're new at this?
Controlled breathing can help, both by calming the nervous system and by increasing lung capacity.
An easy way to start is to use counted breathing: 4 counts in, 4 counts out.
A more advanced form is a triangular breath: 4 in, hold 4, 4 out. Expand it to more counts when that becomes easy.

If you're concerned about masking by ambient noise in a loud classroom – that can be overcome with amplification (*Larsen 2008*), but what's even more effective if the room contains fewer than 100 people is learning to use some simple techniques for vocal projection.

The first is breathing. Everyone please take a deep breath. Did your chest rise and heave? If so, you're not breathing efficiently. The second step in improving the voice is breathing well.

Here's what it looks like from inside:

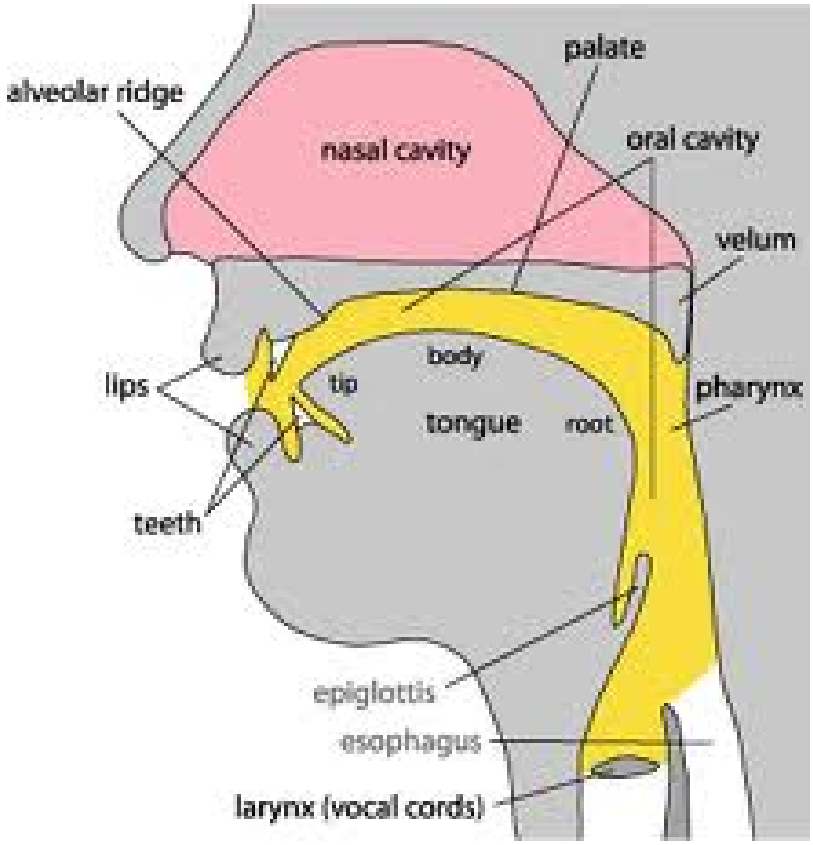
espiratory system



The voice requires air to produce speech. All sound results from the compression and resulting motion of air: when we exhale, the air in the lungs is pushed by the diaphragm muscle out through the windpipe. The larynx sits on the windpipe, and its motions compress air into sound waves which are shaped by the tongue, teeth, jaw and lips.

If you breathe high in the chest, you limit the action of the diaphragm and that limits the amount of air available for speaking. Breathing with the intercostal muscles (the ones between your ribs) – expanding them gently outward on the inhale – gives more air to carry the sound of your voice. The resonators and articulators in your face then have more power to work with:

Vocal Anatomy



As speech is shaped by the tongue and lips, it gets amplified by the sinuses and even by the bones of the skull. The size and shape of your face and torso influence the sound of your voice -- that's why no two voices are exactly alike, although people related to each other tend to sound very similar. But vocal resonance isn't a function of size: small people can have large voices and vice versa.

This gets us to projecting the voice. It's a useful skill to have for lecturing, even if you teach online. A well-projected voice conveys enthusiasm. That's contagious – your students will catch it from you.
So we continue with breathing: place a hand just below your waist. Place the other hand on your ribs at one side. Take in a breath gently, and feel the abdomen expanding slightly and the ribs moving outward just a little. Your chest won't move much. (For comparison, watch a baby or an animal breathing while asleep – there's little or no chest movement; it's all in the abdomen and ribs.) When you exhale, everything relaxes inward without pushing.

The next step is connecting the breath with your voice. A good exercise for that is to say “Ha!”, as if someone has just said something completely ridiculous and claimed it as fact (this will be a good one to practice during the federal election campaign).
Project it over the heads of the people in front of you. Then extend the “ha” into a call, and send it out to the wall you're facing.

Now take a phrase that you might say to a class – a greeting or a nugget of information. Take in a good breath and call it out over the heads of everyone else in the room, to the wall or through a window.

Next: consider variation of tone in the instructional voice. We convey vocal enthusiasm with a combination of pitch and intensity – think of a child running in and reporting something surprising. That energy is compelling, it gets attention. Actors and orators use this technique to convey strong emotion and to stir up a crowd; lecturers can use more subtle forms to encourage students to stay engaged. If you tend to speak in a monotone, their attention will waver and so will yours. If you use

variation of tone and intensity, their brains will be processing tiny auditory surprises that keep them alert to what you're saying by means of how you say it. It's the same way that listening to music works – the combination of familiarity and surprise induces the brain to emit endorphins and to stay tuned in to the content.

Varying your tone results from knowing the range of sounds appropriate to the language you're speaking – knowledge we absorb as babies – but also from exploring what your voice is capable of doing. For that purpose, there's the siren exercise: on an open “ah” sound, imitate a siren moving down from a high pitch and then up again. With practice, it will re-acquaint you with sounds you probably haven't produced since infancy, and they're great fun. They also serve to lubricate the voice, so that your range of inflection expands.6

How all of this relates to student engagement is fairly simple: know your voice, and tune it to the demands of the task it's performing.
-Is your class a small and friendly seminar? Conversational tone is just fine.
-Is it a huge lecture in a room with roaring ventilation? Use a microphone (*Larsen 2008*) unless you can project really well, and don't use one if you can: shouting into a microphone is counterproductive because it makes students think they're being yelled at, and we all know colleagues who do it. Practice varying the speed and intensity of your speech even with a mic – using one can let you speak more intimately, which can work to calm a large class that isn't settling down at the beginning.

-In general: Speak to groups of students as individuals who need to know what you're saying, but will all interpret it a little differently.
-If you use Powerpoint slides, be aware that your students will experience some distraction from what

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6 Many British speakers - depending on region of origin and training - use a greater range of vocal tones than North American speakers of English. The point is not to imitate them, but to listen to what they produce and recognize that your voice has the same potential for variation of tone.

you're saying, so give them time to read rather than reading the slide text aloud to them.

-Avoid vocal fatigue by doing warmup exercises, by staying hydrated, and by having enough nourishment before a long lecture that you don't succumb to fatigue generally.
-Finally, respect your voice: it's a crucial part of your career.

References consulted (a partial list):

Bradley, JS (2002), Acoustical Design of Rooms for Speech, *Construction Technology Update* 51.

Harrison, RV (2008) Noise-induced hearing loss in children: A 'less than silent' environmental danger *Paediatric Child Health* 13(5): 377–382. PMCID: PMC253289

Hearing Foundation of Canada: http://www.hearingfoundation.ca

Kristiansen, Jesper; Persson, R; Lund, SP; Shibuya, H; Nielsen, PM (2013), *Environment and Behavior* 45 n2, p283-300.

Larsen, JB; Blair JC. (2008), The Effect of Classroom Amplification on the Signal-to-Noise Ratio in Classrooms while Class Is in Session. *Language, Speech, and Hearing Services in Schools,* 39 n4, p451-460.

Niskar AS, Kieszak SM, Holmes AE, Esteban E, Rubin C, Brody DJ. (2001) Estimated prevalence of noise-induced hearing threshold shifts among children 6 to 19 years of age: the Third National Health and Nutrition Examination Survey, 1988-1994, United States.
Pediatrics 108(1):40-3.

Pelegrín-García D., Brunskog J. (2012) Speakers' comfort and voice level variation in classrooms: Laboratory research. *Journal of the Acoustical Society of America* 132, 249; *http://dx.doi.org/10.1121/1.4728212*

Scannell, L; Hodgson M, Villareal JGM, Gifford, R. (2015) The Role of Acoustics in the Perceived Suitability of, and Well-Being in, Informal Learning Spaces. *Environment and Behavior*

0013916514567127

Seep, B., R. Glosemeyer, E. Hulce, M. Linn, B. Aytar, and R. Coffeen (2000). *Classroom Noise Booklet.* Melville, NY: Acoustical Society of America. Available from ASA website: *http://asa.aip.org*

Spurrell, K.(2012) Thesis: *Critical Review: What Barriers Exist When Transitioning to Work or Post-Secondary Education Following High School?* University of Western Ontario: School of Communication Sciences and Disorders (Audiology)

Vogel I, Brug J, Van der Ploeg CP, Raat H. (2011), Adolescents risky MP3-player listening and its psychosocial correlates. *Health Education Research* 26(2):254-64. doi: 10.1093/her/cyq091.