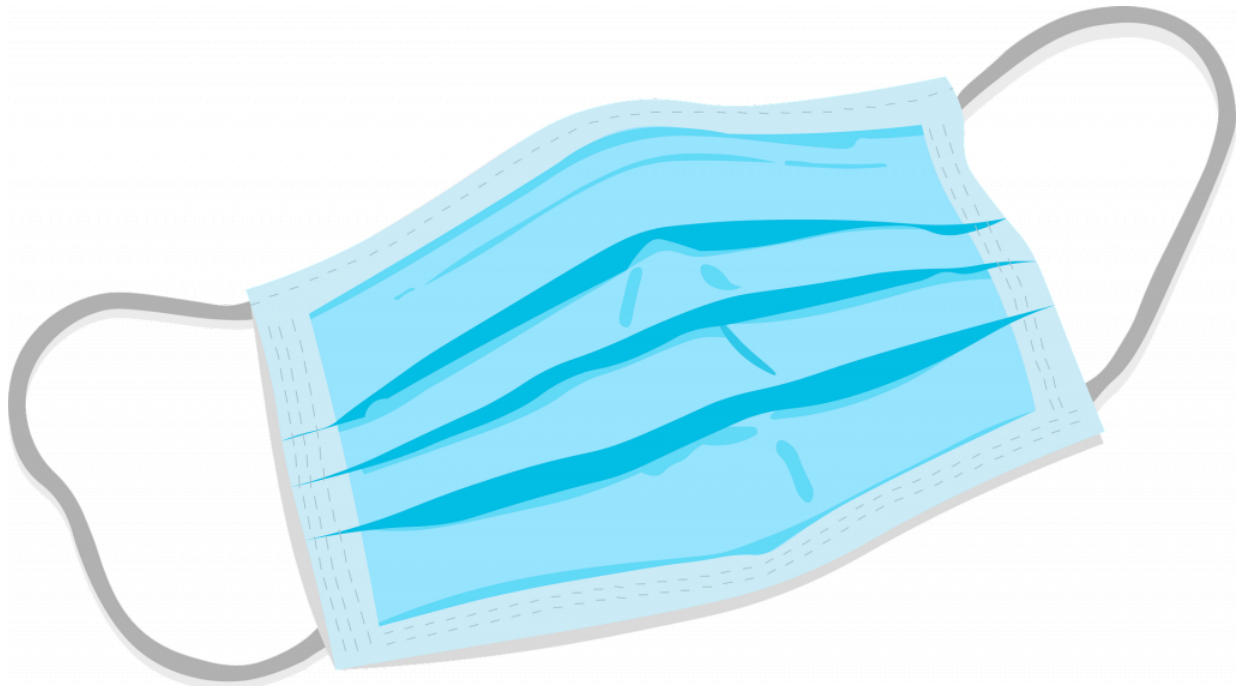


Fallacy of “The Teacher Voice”

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Many educational audiologists are concerned about how COVID-19 masking recommendations for in-person academic instruction will impact the accessibility of spoken language for students who are deaf/hard of hearing. Current and ongoing research studies are indicating that face coverings of any kind have a negative impact on speech understanding. Be it the degradation of speech acoustics resultant of transparent masks/shields, or the loss of nonverbal communication cues resultant of non-transparent masks, essential elements for speech understanding are compromised.¹ Atcherson et al. recently reported that the amount of sound pressure level reduction, depending on the type of mask, shield or combination thereof, is between 5.0db and 29.2dB.² This is a significant loss of acoustic information for students who are hard of hearing but also for students with normal hearing, as it means that even students with normal hearing sensitivity may be expected to listen and learn with reduced auditory and access. Where these studies identify the use of remote microphone technology to be of significant benefit to students who make use of personal hearing technologies,¹ it can also be suggested that with the loss of acoustic and visual information inherent in teacher masking, the use of classroom audio distribution technology will be of benefit to students with 'normal' hearing sensitivity. The recommendation for the consistent use of personal DM/FM systems for students who are deaf/hard of hearing is a topic of critical importance and one that deserves much attention and wide dissemination to teaching/learning teams. The purpose of this article is to emphasize the importance, now more than ever, of classroom hearing technologies for all learners in hope that audiologists reading this article will

distribute it to interested parties.

Classroom Audio Distribution Systems (CADS) have become increasingly commonplace in Canadian classrooms and as stated, are now of greater importance than ever. It is well understood that the purpose of these systems is to make teachers' speech more easily understood by students; particularly when listening from a distance, in a background of, even minimal, noise or now, when wearing masks. It should be made known that when referring to classroom public announcement systems, the term CADS has replaced the term Soundfield FM/Amplification System. The reasons behind this are two-fold: (1) These systems are no longer limited to frequency modulation (FM) signals, and now include digital modulation (DM) and infrared (IR). (2) Their purpose is not to loudly broadcast or amplify teachers' speech but rather to improve speech understanding by distributing speech evenly throughout the classroom.

The benefits CADS have been well established over the past two decades³ yet, regardless of the overwhelming data in support of CADS, there remain teachers who are resistant to their use and many who use them ineffectively. Using terminology simplified for the target audience, this article aims to provide easy-to-understand information that can be shared with teachers and school administrators about why and how to best use CADS.

Why Are CADS So Critical for Learning?

In the course of a typical, in-school day, it is estimated that students are engaged in listening activities for about 45% of the time⁴ with that time increasing in the elementary grades. This means that students are listening to learn for a significant amount of their in-class time. Also, while it is not expected that young children talk like adults or write like adults, there does exist the assumption that they hear like adults. However, neither neurologically nor physiologically, is this the case.⁵ This is because the part of the brain that is responsible for hearing and understanding, the auditory cortex, is not mature until well into the teenage years.⁶

Regardless of the above, some teachers emphatically state that they do not need a microphone; that they teach using their "teacher voice." By not using a microphone or stating that they "don't need a microphone" potential messages may include⁷:

- "I can hear fine, and everyone is just like me."
- "I'm assuming that everyone can hear me, so it's your problem if you can't."
- "My discomfort in hearing my own amplified voice is more important than your need to be included."
- "If you really want me to use a microphone, you'll have to assert yourself to request and/or justify that need."
- "I am willing to exclude people."
- My belief that 'I can project' matters more to me than your ability to hear."

Let's take a moment to discuss that final point - projecting one's voice. It is accurate that by using a "teacher voice" some speech sounds (e.g., /a/, /e/, /oo/, /m/, /b/, /v/) are able to be made louder and more easily heard. These sounds are inherently low pitched, loud, and can be made even louder through the use of the diaphragm. It is these sounds that primarily account for speech

volume, or our ability to 'hear' speech (Killion & Mueller, 2010)

Now let's consider some of the other speech sounds including /k/, /s/, /t/, /th/ and /p/. These sounds are inherently high pitched and quiet and are unable to be made louder using the diaphragm. They primarily account for our speech understanding⁸ and are responsible for giving meaning to plurals, possessives, ordinals and verb-noun agreement. This means that these quiet, high pitched sounds are critical to one's understanding of spoken language. Unfortunately, they are the quietest of the speech sounds, they don't travel across classroom distances and they cannot be made louder with any "teacher voice". As an example, attempt to loudly project an /f/ sound, a silent /th/ sound or a /p/ sound.... it cannot be done. A CADS microphone can pick up those sounds and distribute them to all of the students in the room. Without a CADS, a student with normal hearing sensitivity, seated in the back of the classroom will struggle to hear high pitched sounds over classroom noise and as a result, could hear the words talk, talks, talked, top, tops, topped, thaw, thought, fought all as /aw/. It becomes clear how critical being able to hear these quiet sounds are and how while speaking in a "teacher voice" may result in louder speech, it does not result in speech that is clear.

Remind teachers to not assess speech understanding in their classrooms on their own. An adult standing at the back of the class assessing their ability to understand the talker at the front of the class is not adequate. An adult has a mature auditory cortex as well as a reservoir of language, vocabulary and background knowledge that allows for greater accuracy than children when "filling-in" auditory information that may have not been heard or been misheard.⁵

CADS Volume

While it is indeed encouraging to see teachers using CADS consistently, they are more often than not, set much too loud. The goal with CADS is not to amplify the voice, but rather to distribute it evenly throughout the classroom allowing students seated in the back row to hear the soft sounds just as well as the front row.

To achieve the best speech signal possible, the voice volume from the CADS **should not** be loud and booming. Loud CADS volumes compromise the speech signal rather than make it more accessible. When volumes are set too loud, those louder, lower-pitched sounds (vowels, m, n, d, b, g, z, etc.) smear or mask out the quiet, high pitched sounds (s, sh, f, th, t, p, k) resulting in poorer, rather than improved, speech understanding. Volumes set too loud will result in, although louder, speech that is less clear than speech presented at a moderate volume.⁹

Due to variability in CADS makes/models, microphone placement, and individual talker characteristics, providing a set volume number recommendation is ineffective. To best ensure that teachers are not setting CADS volumes too loudly, it is recommended that the volume be adjusted so that the sound is only slightly louder than normal conversation everywhere in the classroom. When setting the volume, it is recommended to do so with students in the classroom. Suggest turning the volume down, then slowly increasing the volume until the students farthest away report that the sound is 'on'. At this volume setting the individual using the microphone may not be aware of the sound dispersed to the back of the room, but the students seated there will.

As stated above, one variable that will affect the volume setting is where the microphone is placed. When the microphone is placed too far away from the mouth, teachers tend to increase volume levels which often result in feedback or distortion. The most effective microphone placement (both

lapel and lavalier style) is at the sternum level, unobstructed by clothing and away from unwanted noise sources such as keys worn around the neck, scarves, and jewelry.

While CADS technology is a critical tool for improved speech understanding in classrooms it must be used correctly. (1) CADS should be used for all communications; curricular and non-curricular. (2) Their volume should be adjusted so that they sound only slightly louder than normal conversation loudness, everywhere in the classroom. The following suggested routine will assist teachers in assessing the volume of the system:

1. Ensure that the students are seated quietly in the classroom. The CADS should not be used to gain the attention of the class.
2. The person who uses the transmitter would wear the microphone and the system would be turned 'on' and worn at the sternum level.
3. If available, a second adult would walk around the room listening, as the individual wearing the microphone speaks at a normal conversational level.
4. If a second adult is not available ask the students, in a normal conversational voice, if the microphone is on.
5. While the talker might not be able to easily tell if it is on – other people in the room will. The talker may need to ask the back row "Am I on?"

Rule of Thumb:

If you can easily hear yourself through the speakers the volume is too loud!

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