

Hearing is Fun

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ABSTRACT

This is a general outline for a classroom activity for 6 – 12 yr. olds, on the topic of sound. Class size should be limited to about 15 people. The activity lasts about 45 min and works best in a quiet space for the classroom work, along with access to a safe and acoustically diverse (but not overly loud) outdoor environment for the sound walk. A supply list is included.

OUTLINE INCLUDING SPEAKING NOTES IN ITALICS

Gather in a circle seated, preferably on the floor.

This is a session about hearing, one of our most important senses. I love sound, and I love using my ears to listen. I want to share that excitement with you. We often overlook our ears in favor of our eyes. Things we see grab our attention, but the stuff we hear is often what provides the excitement and the feeling-part of our experience.

Let's begin by being absolutely silent for a few moments.

Hold the group quiet for at least 60 seconds. Begin by asking what they heard. Observe how different it is to really listen and concentrate on sound. There are no right or wrong answers to this exercise.

Did you ever think about how cool it is that you can tell where sound originates even with your eyes shut? Close your eyes and then with your right hand point at me as I walk around the room. And now I will ask my assistant to talk and do the same. Use your right hand to point at me and your left hand to point at Joe Blow. OK, open your eyes.

It looks to me like you all were just about right in your location. Any ideas on how you did that?

The ears and your brain actually use both time and loudness cues to compute the location of a sound. To you it seems natural, but it is actually a complex computation. A computer, a very sophisticated computer, could do the same. It would take into account the difference in loudness (also called intensity) between the sounds at the two ears, caused by the head blocking some sounds more than others, depending upon the direction they come from, as well as the difference in the arrival time of the sounds at the two ears, caused by the difference in the time it takes sounds to travel to the nearer and farther ears. And we are talking about very small differences in time, thousandths of a second and equally small differences in loudness level.

So, how does the ear work?

The part of the ear we are all familiar with, the part we can grab a hold of, is called the pinna. It is designed to collect and funnel sound down your ear canal to the eardrum. Some people think the eardrum is what lets you hear, but it is only part of the story. The eardrum is, like its name implies, a drum head that in turn transfers its motion through the three tiniest bones in the body, the ossicles. These 3 bones are attached to the cochlea in which is contained the hearing organ. Once the vibrations enter the hearing organ they cause the specialized nerve cells, called hair cells, to move, which generates electrical signals that travel along the auditory nerve to the brain. These signals are understood by our brain as sound.

There are some very big differences between hearing and seeing. For example, with vision you can study the object you are looking at – like a picture, or a person, or a landscape. You can even clearly compare two objects because you can repeatedly look from one to the other, or even see both at the same time. But with sounds, they are gone before you know it. An interesting word that describes this is evanescent – meaning vanishing quickly. In fact, as you listen to me, you have to pay careful attention because even as I sound a word with my mouth, the first syllable has past your ears and is lost in history while the second one is still being formed.

Think for a moment about music videos on MTV. What do you notice about the images? About the sounds? (Wait for some answers). Do you notice how the images are constantly changing, never lasting more than a second or two? But the music constantly and continuously flows throughout the entire video. What would it be like if the music was cut up into disjointed 1-sec segments while the image was a constant single picture for 2 or 3 minutes? It wouldn't work to well would it? Sound takes time to digest. It requires appreciation for its impact to be felt and understood.

Another big difference is how sound envelopes you. Sound pours into the hearer's ears whereas sight places the observer on the outside looking at, or looking in. Vision comes to the viewer from one direction whereas sound confronts us from all directions and places us in the center of an auditory space, surrounding us and hence often greatly impacting attitudes and emotions. When you listen, it is as though you are in the sound. Close your eyes and feel how the sound is all around.

If you have a large drum available beat it slowly and forcefully. Let the children hear it, and feel it reverberate throughout the space.

And a final difference is that your ears are always turned on. You have eyelids to shut your eyes and let them rest. We don't have earlids. In many ways that is a good thing. Our ears are a constantly alert early warning system – whether they wake us when the alarm goes off, or alert us as someone enters our space, or warn us that something sounds wrong. In fact, did you know that your auditory mechanism is the first sense to function in a fetus, and continues to work for a few hours after death. Scientists have actually measured electrical responses from the auditory nerve even after animals have died.

To let you experience how cool your ears are we are now going to take a sound walk.

If feasible, blindfold the children (being careful the blindfolds go over the top of the ears and don't cover the pinna or earcanals), and with the help of adults line the children up, one hand stretched forward to hold the hand of the person in front and one stretched backward to hold the hand of the child behind. Then slowly take them on a 5-minute or so walk, preferably out of doors. Instruct them to listen carefully to all the sounds, as the game when they return, will be to identify all the sounds that were present. Have adults provide some added sounds if the acoustic environment is not sufficiently rich. The adults can stand a few feet away as the line passes and tap a stick, snap their fingers, play an instrument, drop an object, whistle, etc.

Return to the classroom space, remove their blindfolds, and ask them to enumerate the sounds they heard. Can they identify the “constructed sounds,” i.e. those made by the adults, versus those sounds naturally occurring in the environment. Ask them,

- what was the loudest/quietest sound,
- the highest pitched sound,
- a sound that occurred more than once,
- and perhaps what sound would they choose to eliminate.

Put the blindfolds back on and play an identification game. Make the following noises and as they are sounded ask kids to call out and identify them. Add or delete sounds of your choosing, using about 10 sounds in all. Avoid sharp or sudden sounds that could startle or scare a blindfolded child.

Pick 10 to 12 Sounds from this List

Tear and/or crumple a piece of paper	Snap a picture with a 35-mm camera
Scrunch a box of cereal	Shake a box of Cracker Jack
Roll a can across a tile or wooden floor	Light a match or flick a lighter
Tap a drum	Zip a zipper
Blow a flute or harmonica	Shake a jar of marbles
Blow your nose	Screw on a jar lid
Honk a bicycle horn	Ring a cell phone
Jangle keys	Pop chewing gum or bubble gum
Squeak your sneaker on a linoleum floor	Open a can of soda
Run your fingers along the teeth of a comb	Close/latch a door
Crack one of your knuckles	Extend/retract a ball point pen
Make the loud sucking sound as you empty a glass thru a straw	Spin a combination lock dial
Make a kissing sound	Clock ticking or a metronome
Bounce a tennis ball, a basketball, or ping pong ball	Shut the rings on a 3-ring notebook
	Blow across the mouth of a glass bottle

Ask them to think about how they were able to identify those sounds. Talk about their auditory memory. What are the characteristics that let them identify the sounds (frequency/pitch, level/loudness, time variation)?

The final game is the Name Game, with a twist. The instructor begins by saying his/her first name and making a sound. The sound must be made using only your mouth and body parts. Be emotive, be grand. Encourage the kids to be bold and brash and make a sound that expresses how they feel or who they are. I have enjoyed making my sound a big loud lengthy belly laugh. The next person then repeats your name and sound, and adds their own name and sound. It continues around the circle. As the instructor you should conclude the circle, by playing the game a second time once the last child speaks. This can be lots of fun.

Close by briefly pointing out how much sounds can affect how we feel, as evidenced by the game that was just played. Then talk about the fact that not all sounds are good sounds; some can harm hearing.

There are danger signs that let you know when sounds may be harmful to your ears. For example if you have to shout at arm's length to be heard, the sounds are about 85 dB or louder. Scientists have determined that this level of sound, with prolonged exposure, will begin to cause hearing loss in some people. Another personal hazard indicator is tinnitus – ringing, hissing, or humming in the ears in the absence of actual sounds outside the ears. If your ears are quiet prior to a noise exposure and noisy afterwards, this is like a “soundburn” of the hair cells of the inner ear, indicating they have been irritated and overworked. Repeated exposures to such a noise can cause hearing loss and a permanent tinnitus for the rest of your life.

When you are exposed to potentially dangerous sounds like those I just described, practice safe listening. Try to stop or turn off the sounds, avoid the sounds, or use hearing protection – earplugs or earmuffs to reduce the sound to a safe level. Hearing protectors don't remove all ability to hear, but simply reduce the noises to what in most cases will be safe levels and also levels which are more pleasant for most listeners.

Sounds don't have to be loud to be fun, and sounds don't have to be painful to be potentially hazardous to your hearing. Think about making the world a quieter place in which we can all hear for a lifetime.

Supply List (depending on sounds that are selected)

Blindfolds (REQUIRED)	Box of Cracker Jack
Drum (large)	Wooden safety match or Lighter (Bic or Zippo type)
Drum (small)	Metal zipper
Paper	Glass jar of marbles w/screw-on lid
Partially filled cereal box	Cell phone
Empty metal 5-lb. coffee can	Chewing gum or bubble gum
Flute and/or harmonica	Unopened can of soda
Bicycle bulb-type horn	Retractable ball point pen
Key chain	Combination lock
Comb	Loud ticking clock or metronome
Straw and glass of liquid	3-ring binder
Tennis ball and/or basketball and/or ping pong ball	Glass soda bottle
35-mm camera	