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The Science of Soothing: Using Sounds to Find Calm

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The Science of Soothing: Using Sounds to Find Calm

Hearing sounds can change our mood and influence our emotions, and many people find noises like ocean waves or rain especially soothing. In this lesson, students will examine the components of sound waves and learn how the ear and brain work together to process sound. Students will then apply their understanding by creating and recording their own calming soundtrack and reflecting on the role of sound in their own lives.

Suggested duration

- 60 min class period

Essential questions

- What role does sound play in soothing techniques?
- What are sound waves and how are they interpreted by the brain?

Objectives

The Science of Soothing: Using Sounds to Find Calm

All students will...

- Explain how caregivers and environmental factors help soothe infants by analyzing different soothing techniques
- Connect the physics of sound waves (frequency, amplitude, wavelength) to soothing sounds including white noise and rhythmic movement
- Understand how sound travels through the ear and is processed by the brain, by learning how sound waves are converted into nerve impulses
- Create their own white noise or ASMR-inspired soundtrack using different sound

properties to demonstrate how sound contributes to soothing.

Materials

- Video clips included in slides: crying baby being soothed, sound wave overview (Science Sauce)
- Audio clips included in slides: white noise, heartbeat sound, caregiver shushing, rain, ocean waves
- Simple sound-making objects (like paper, fabric, shakers, small drums, etc)
- Phones, tablets, or computers to record and edit sounds
- Speakers to play sounds

Supplementary Materials

- Science of Soothing Slide Deck
- Science of Soothing Worksheet

Based on

The Stavros Niarchos Brain Insight Lecture

- “Nurturing Growth in a Dynamic World”
By Dima Amso, Ph. D. and Dani Dumitriu, Ph.D.



Instructional Activities

1. Introduction | ⌚ 10 min

Engage: Show a short video of a crying baby being picked up and soothed by a caregiver.

- Ask students: Why do you think the baby stopped crying?
- Discuss the common responses (warmth, motion, sound, caregiver's voice, heartbeat).

Explain: Different Soothing Techniques:

- Swaddling: Gentle pressure mimics time during pregnancy
- Shushing/white noise: Continuous, steady sound that can be calming
- Rocking: Connects sound vibrations and movement
- Caregiver's Voice: Familiar and rhythmic

Explore: Play different audio clips (heartbeat, white noise, shushing)

- Ask students to describe the sounds: Are they high or low-pitched? Loud or soft? Predictable or unpredictable?
- Relate this and discuss why certain sounds are calming.

2. Understanding Sound and the Brain: Discussion & Worksheet Activity | ⌚ 15 min

The Physics of Sound as a Wave:

- Define frequency (pitch), amplitude (volume), and wavelength (distance between waves).
- Explain how lower frequencies (like heartbeats, white noise, and whale sounds) are soothing

- Discuss how amplitude affects comfort (too loud is overstimulating, quiet is calming).
- Connect rhythmic movement to vibrations, linking rocking with steady frequencies

Sound and the Brain: Explain how sound travels through the ear and is processed by the brain.

- Sound waves enter the ear canal and hit the eardrum
- The eardrum vibrates, which moves tiny bones in the middle ear
- These vibrations next reach the cochlea (inner ear) and move fluid inside the cochlea
- Moving this fluid inside the cochlea bends specialized cells (called hair cells), and bending these cells creates a nerve impulse
- The nerve impulse travels from the inner ear to the brain via the cochlear nerve
- Several places in the brain process this nerve signal, which is how we hear sounds

3. Hands-On Activity: Create an ASMR/White Noise Soundtrack! ⌚ 25 min

Brainstorming

- Students list calming sounds they associate with relaxation (rain, whispering, ocean waves)
- Discuss: What properties of these sounds make them soothing? .

Sound Experimentation

- Students create their own sounds using objects (e.g., rubbing fabric, whispering, tapping softly, playing quiet instrumental music).
- Students record the sounds using phones, tablets,



Optionally, they can mix multiple sounds using simple audio editing apps.

Presentation and Reflection

- Students play their sounds for the class
- Students explain why they chose certain sounds and how they relate to the physics of sound waves.
- As a final reflection, students find a soothing sound (a song, rain, nature sounds, etc) that they might use for their own relaxation in the future.

4. Wrap-Up and Assessment | ⌚ 10 min

Discussion:

- How does understanding the science of sound help us care for others?
- How do caregivers instinctively use physics to soothe babies?
- Could these concepts apply to stress relief in adults?

Exit Ticket: Invite students to write a short response about how sound can be used to promote relaxation in different settings?



Standards

<u>NEXT GENERATION SCIENCE STANDARDS (NGSS)</u>	▪ HS-PS4-1 (NGSS) — Analyze relationships between frequency, amplitude, and wavelength and their effects on sound. ▪ HS-LS1-8 (NGSS) — Explain how sound waves are converted into neural signals and processed by the brain.
<u>COMMON CORE STANDARDS</u> <u>SOCIAL EMOTIONAL LEARNING BENCHMARKS (NY STATE)</u>	• <u>CCSS.ELA-LITERACY.RST.9-10.3 — Follow multistep technical procedures during sound experimentation and creation.</u> • <u>Apply strategies for emotional regulation and stress management through sound.</u>



Acknowledgements

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