Lesson Plan Title
The Physics of Waves: A Dance Representative of Sound and Light Transmission

Grade Level
8th

Subject Area
Science

MSCCRS
P.8.6.1- Collect, organize, and interpret data about the characteristics of sound and light waves to construct explanations about the relationship between matter and energy.

P.8.6.8- Compare and contrast the behavior of sound and light waves to determine which type of waves needs a medium for transmission.

Conceptual Understanding:

Waves have energy that is transferred when they interact with various types of matter. A repeating pattern of motion allows the transfer of energy from place to place without the overall displacement of matter. All types of waves have some features in common. When waves interact, they affect each other resulting in changes to the resonance. Many modern technologies are based on waves and their interactions with matter.

Art Form
Dance

MSCCR Creative Arts Standards
DA:Cr.1.1.8b- Identify and select personal preferences to create an original dance study or dance. Use genre-specific dance terminology to articulate and justify choices made in movement development to communicate intent.

Enduring Understanding:
Choreographers use a variety of sources as inspiration and transform concepts and ideas into movement for artistic expression.

Essential Questions:
Where do choreographers get ideas for dances?

Duration
2 hours - two one hour classes

Materials
Body

Streamers, ribbon or cloth of some type
Projector

Objectives
TLs review the characteristics of sound and light waves.
TLs create a dance that represents the differences in sound and light waves.

Vocabulary
Light waves
Sound waves
Medium
Electromagnetic waves
Transverse waves
Compressional/ longitudinal waves
Shapes
Types of lines
Hard and Soft movement

Lesson Description

1. TTW say, “Waves have energy that is transferred when they interact with various types of matter. A repeating pattern of motion allows the transfer of energy from place to place without the overall displacement of matter. All types of waves have some features in common. When waves interact, they affect each other resulting in changes to the resonance. Many modern technologies are based on waves and their interactions with matter.”

2. TTW continue, “Waves are created when energy is transferred through a medium like water or air. There are two types of waves, transverse and longitudinal (sometimes called pressure or compression waves). When people think of waves, they often think of transverse waves.”

3. TTW review light and sound waves with the learners.
    a. Sound waves or transverse waves, need a medium, and cannot travel through empty space

    b. Light waves or compressional waves do not need a medium and can travel through empty space. They are also apart of the electromagnetic spectrum

4. TTW show two short videos from NASA’s website: https://www.nasa.gov/specials/X59/science-of-sound.html#sonic-booms

5. TTW refer to the anchor chart when presenting this information. TTW ask the learners to copy the information from the anchor chart in their binders as well so that they can have a visual to take home.

6. TTW explain sound waves need a medium to travel through and a medium can be a solid, liquid, or gas. TTW explain that sound waves travel the fastest in a solid and the slowest in a gas.

7. TTW probe the learners and ask the students why they feel sound waves travel the fastest in a solid. TSW respond and their answers will vary (*i.e., there are more particles to bounce off of*).

8. TTW then explain that we will be creating a dance to represent the difference in sound and light waves.

9. TTW explain that there basic dance techniques that you can use to represent a concept.

10. TTW pass out a handout to the learners that discusses the body, action, space, time, and energy.

11. TTW allow students to watch a dance entitled, "waves."

12. TTW ask students, "*Where do choreographers get ideas for dances?"*

13. TTW ask, "how are these two concepts related?" As the teacher reviews each concept, the learners will need to demonstrate with their bodies as well.

14. TTW explain that they will be creating a dance that needs to display each component that we talked about. The dance will need to represent the difference in light and sound waves and utilize one of these two videos as background media and music: https://www.nasa.gov/specials/X59/science-of-sound.html#sound

15. TLs will have the rest of the class to create their dance with their groups of 4 students.

16. The following class will be utilized to allow TLs to practice their dances and then perform their piece in front of the class. The teacher may want to allow students to discuss "costuming" and other visual effects that lend themselves to describing the concept.

17. TTW utilize *The Elements of Dance* handout as a reference/rubric when the students are performing.

18. Following the performances, TTW ask, "where did you get your ideas for your dance? What inspired you? What do you think was your most creative accomplishment with your dance?"

Recommended Resources

The Elements of Dance-

The Elements of Dance

Ask:	Who? *A dancer*	does what? *moves*	where? *through space*	when? *and time*	how? *with energy.*
B.A.S.T.E.	BODY	ACTION	SPACE	TIME	ENERGY
These are just some of the ways to describe each dance element. . . there are many more possibilities for each element. *Can you think of others?* *Add your own ideas & words…*	**Parts of the body:** Head, eyes, torso, shoulders, fingers, legs, feet … **Initiation:** core, distal, mid-limb, body parts **Patterns:** upper/lower body, homologous, contralateral, midline …. **Body shapes:** Symmetrical/asymmetrical rounded twisted angular arabesque **Body systems:** muscles bones organs breath balance reflexes **Inner self:** senses perceptions emotions thoughts intention imagination	**Non-locomotor (axial):** stretch bend twist turn rise fall swing rock tip shake suspend ***Locomotor (traveling):*** slide walk hop somersault run skip jump do-si-do leap roll crawl gallop chainé turns	**Size:** large small narrow wide **Level:** High / medium / low **Place:** on the spot (personal space) through the space (general space) upstage/downstage **Direction:** forward/backward sideways diagonal right/left **Orientation:** facing **Pathway:** curved/straight zig-zag random **Relationships:** in front beside behind over under alone/connected near/far individual & group proximity to object	**Metered:** pulse tempo accent rhythmic pattern **Free Rhythm:** breath open score sensed time improvisation cued **Clock Time:** seconds minutes hours **Timing relationships:** before after unison sooner than faster than	**Attack:** sharp/smooth sudden/sustained **Weight:** *Strength:* push, horizontal, impacted *Lightness:* resist the down, initiate up *Resiliency:* rebound, even up and down **Flow:** free, bound balanced neutral **Quality:** flowing tight loose sharp swinging swaying suspended collapsed smooth

Extended Learning Activities

N/A

Sources

N/A

Tips

TLs have already been introduced to light and sound waves, but make sure to go over them in-depth again. It is a hard concept to grasp.

Assessment Strategies:

Written Work - * Allow students to submit planning and documentation of the choreographic process (sketches of written ideas) and any notes/research.
* Students may even write captions for photos taken during their performance.

Self Assessment - The teacher may want to give students the opportunity to consider the quality of their own learning and performance. They may want to conference with the teacher or give a written

response as to their individual and collaborative efforts to meet curricular objectives, benchmarks, and other specified criteria.

Hand Signals - The teach can ask the student to display a designated hand signal to indicate their understanding of the concept.
“I understand waves and can explain it to a friend.”
(thumbs up = yes; thumbs down = no; wave hand= maybe).

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