**Q405: Saturday Science**

**Lesson Plan Template**

**Lesson Topic:** Sound and Communication

**Grade level(s):** K-1st

**Instructor Names:**

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| **Desired Results** |
| **Overarching Focus Question for the Session:*** How does sound travel?
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| **Central Focus/Topic for today:**Students will understand:* That sound can travel at different distances with varying sound levels (loud and quiet).

Therefore, the guiding question for today’s learning is:* How does sound vary over certain distances?

  | **Relationship that this central focus has to the overarching big idea/question for the unit*** Students will observe a demonstration of sound traveling through different distances and different apparatuses, then asked questions to guide them to a Why explanation.
* This explanation will help them create and revise their final design for the lesson.
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| **Student objectives (outcomes):***(Remember, this is like the performance expectation statement in the NGSS, so you need to be incorporating Science Practice in this/these statement(s).*Students will be able to:* Make observations and/or measurements on how the same volume of sound differs at different distances
* Plan and carry out investigations on how to create a device with sound (using vibrations, and volume/distance) to communicate across the room
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| **Timeline of Activities for the Day** |
| \**Provide a breakdown of how long each activity will take, who will lead the segments of the activities, when breaks will occur or other transition points, etc.**\*Identify by highlighting in blue the portion of the lesson you team wants video-recorded each week. This should be ~45 mins***9:30-9:40:** Wait for everyone to finish arriving **9:40-9:50:** Reiterate classroom expectations and introduction of topic for the day **9:50-10:10:** Using the GarageBand app and having students act out/draw out/or use an object to demonstrate the waves based on what they are hearing**10:30-11:00:** Bathroom break and snacks**11:00-11:15:** Have students come up with ways for us to communicate to each other at different distances**11:15-11:30:** Draw/creating devices with partner **11:30-11:35:** GoNoodle (Banana Banana Meatball) **11:35-11:45:** Bathroom Break **11:45-12:00:** Finish creating devices with partner  |
| **Learning Plan (First three E’s of the 5E model)***Any of these phases can be repeated should you have more than one activity to describe OR a complex activity with multiple iterations of some phases.* |
| **ENGAGE**  Students will be asked to draw a wavelength based on a sound.Teacher will stand in the middle of room and play a sound, then give 30 seconds for students to draw, act out, or use items to visualize the sound.Students will then discuss in small groups and then as a whole class.**Questions:** **What were some ways you all acted out/drew the sounds?****Where the sounds all different or the same?****How were they different?****What did you do differently?****EXPLORE** Teachers will be proposing a question/problem and asking students to think about objects or ways that sound can travel in order for two people to communicate.**Problem Set-up**: You are secret agents and have to create your very own secret codes to communicate with your partner at a certain distance. The problem is that your fingerprints cannot be found at the scene so you must create a device that allows your code to travel from Point A to Point B. The device can be made up of any materials that your secret agency provides for you, but your device must be able to produce a sound. **Questions:** In what ways do you think you’ll be able to communicate with your partner? What initial ideas do you have about getting sound to travel across a room? How would the ways in which you communicate change if you moved closer or further away from your partner? What if there was a barricade/obstacle in your way? How would you communicate then? Students will begin to brainstorm ideas for their communication device, but nothing will be written down quite yet; it will only be in their minds. **Brain Break:** [**https://family.gonoodle.com/activities/banana-banana-meatball**](https://family.gonoodle.com/activities/banana-banana-meatball) **EXPLAIN***Making communication devices* * Teacher will start explain by explaining to students that they will be working in partners to make their communication devices
	+ “Alright students, so in order to make your communication devices with sound, you are going to need to work with a partner. I am going to call off names and when I call you and your partners name, I need you to stand up and link arms with your partner so that I can see that you guys are paired together. You are your partner are going to try and make a device that can make sound travel across a room without yelling, just like Karly explained before.”
* Teacher will explain how the design process works
	+ “When you go back to your tables and think about what you might do for your communication device, can you just start making your device? What do you have to do first? You have to plan it! So here (show sheet) there is a planning sheet where you and your partner will draw out the plan for your device. You need to think about the materials you are going to use, what it is going to look like, and how you are going to get the sound across the room without yelling. So, before you touch any materials, what do you have to do first? Then, when you are done drawing before you can get started on creating, you have to get a signature from a teacher and you have to tell that teacher how your device is going to work and what materials you plan on using. So someone tell me one more time what I have to do before I can touch the materials. Can I look at the materials to get ideas?
* Teacher will have students start their drawings in the design process. While students are drawing teachers can ask questions like
	+ “What kind of materials are you using?”
		- “Why do you think that would be best?”
	+ “How do you think your device is going to get the sound across the room?”
		- “Can you show me where?”
	+ “What did we talk about last week that might help you in creating your device?”
		- “How might thinking about vibrations help you?”
	+ “Can you show me what you have so far?”
* When students are ready to start creating their communication devices, teacher will remind students about handling materials and following their design.
	+ “Alright, it looks like you guys are ready to start creating your devices, now when you start making devices, try to be as clean as possible, that way we can leave and can go back to your parents or whoever is picking you up as quickly as possible, we also want to make sure that we are being respectful to the materials. Can one of you tell me what that looks like? Good, and if you can’t be respectful to the materials, you will have to be asked to sit out, because that is not being safe in the classroom, just like we talked about last week. And one last thing, only teachers are using scissors today, so if you need something cut, you will need to raise your hand and ask a teacher.”
* When time is up, students will be asked to clean up the messes that they have made
	+ “Alright students, time is up, we need to clean up any messes that we have made, and even if it isn’t your mess, it would be super nice of you to help out and help clean up any forgotten messes as well!”

**ELABORATING/EXTENDING Understanding**  Finish creating devices |
| **Assessment Evidence (\*This is the Evaluation Phase of the 5E approach)** |
| **Performance Task(s):*** Students will create drawings of proposed sound devices
* Students will create first draft of sound devices
 | **Other Evidence:*** Student responses
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| **Materials + Quantity:*** Cups (25)
* String (roll) (or at least 3 yards)
* Tape (whole roll of scotch tape and masking tape)
* Glue Gun (ONLY TEACHERS USE)
* Paper (a lot)
* Cardboard Tubes (as much as possible)
* Rubber Bands (a handful)
* Straws (25)
* Cereal Boxes (As much as possible)
* Plastic Bottles (10)
* Ribbon (roll)
* Jingle Bells (3)
* Shakers (2)
* Plastic Eggs (2)
* Beads (handful)
* Pack of Post-it Notes (1)
* Rope (not the big heavy one but a smaller lighter one that’s kinda long)
* Drawing plan sheet (will email later) (21)
* Scissors (5) (adult because we will be cutting)
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| **Required Accommodations/Modifications:*** **Gear up:** Students who need more of a challenge can either start to think about thinking about their sound devices around a corner, or write a sentence about their sound device on why it is going to work.
* **Gear Down:** Students can mimic the model that teachers provide if coming up with a communication device is too hard
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**Lesson Topic:** Sound and Communication

**Grade level(s):** K-1st

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| **Desired Results** |
| **Overarching Focus Question for the Session:** * How does sound travel?
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| **Central Focus/Topic for today:**Students will understand:* Students will understand that they must use different volumes at different distances from each other (louder/quieter)

Therefore, the guiding question for today’s learning is:* What can we do to hear sounds at a distance?

  | **Relationship that this central focus has to the overarching big idea/question for the unit*** In order for students to understand how sound can travel, they can learn how the concept of volume can help or hinder the distance the sound can travel. By exploring different ways in which we can hear sounds at different distances, this will then help them revise and think about their communication devices.
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| **Student objectives (outcomes):***(Remember, this is like the performance expectation statement in the NGSS, so you need to be incorporating Science Practice in this/these statement(s).*Students will be able to:* Make observations and/or measurements on how different distances can change how sound travels
* Plan and carry out investigations on how to create a device with sound (using vibrations, and volume/distance) to communicate across the room and around corners
 |
| **Timeline of Activities for the Day** |
| \**Provide a breakdown of how long each activity will take, who will lead the segments of the activities, when breaks will occur or other transition points, etc.**\*Identify by highlighting in blue the portion of the lesson you team wants video-recorded each week. This should be ~45 mins***9:30-9:40:** Wait for everyone to finish arriving **All****9:40-9:50:** Reiterate hallway etiquette, introduce the topic for the day **All****9:50-10:00:** Show BrainPOP and have a short discussion about what students learned afterwards (record after the video is shown) **10:00-10:30:** Demonstrate volume (First 10 minutes) **10:30-11:00:** Snack **All****11:00-11:15:** Explain how volume applies to stuff ( explanation and zoom in on one group to see one revision) **11:15-11:45:** Adding to device and testing **All****11:45-12:00:** Sharing  |
| **Learning Plan (First three E’s of the 5E model)***Any of these phases can be repeated should you have more than one activity to describe OR a complex activity with multiple iterations of some phases.* |
| **ENGAGE** * We will begin the lesson by watching a BrainPOP video. In this video, students will receive a review of the sound concepts we have been teaching the past couple of weeks, which are vibrations and sound waves. The video will also introduce the next component we are adding for the final week, which is volume
	+ <https://jr.brainpop.com/science/energy/sound>
* After the video, the teacher will ask questions and provide scenarios where vibrations, sound waves, and volume concepts can be applied
	+ **Questions:** How would you describe sound or in other words, can someone tell me their own definition of sound? How is sound made/how can we hear? In what ways can sound move? How can sound be blocked?
	+ **Scenario 1:** You are in your basement or in your room behind a closed door playing video games or listening to music. Your mom just finished making dinner and is trying to get your attention to let you know dinner is ready. What would your mom have to do in order to get your attention? How will she get you to hear her?
	+ **Scenario 2:** You are outside at recess. You decide to play baseball with your friends. The other team is up at bat and you are trying to distract them from the bench. The batter is on the opposite end of the field from you. How would you get the batter to hear you? What if the batter was right beside the bench? How would you adjust your volume (how loud and soft a sound is)?
	+ **Scenario 3:** You are in your classroom and you thought of something exciting to tell your friend who is sitting right next to you. There is a problem. It is silent reading time and you are afraid that your teacher will hear you and you will get in trouble. How will you tell your friend your news?

**EXPLORE*** Teacher will have students come to the carpet, and sit criss-cross with their hands in their laps.
	+ “So now we will be looking at how sound can sound different at certain distances using certain volumes. I want everyone to put their listening ears on, and listen to see if you can tell me what song you are hearing. I also want you to pay attention to any differences that you might hear every time that the song is changed.”
* Teacher will demonstrate this idea by playing a song on the speaker at 100% volume level.
	+ “Can you all hear what song this is? Can anyone name the song? What do you notice about the volume level?”
* Teacher will then play another song at 75% volume level.
	+ “Can you still hear the music? What song is being played? What is different from the last song that I played? (Aiming for them to notice the decrease in the volume)
* Teacher will then play a different song at 50% volume level.
	+ “Can you hear the music? What song is being played now? Are there any differences that you notice from the last song, and if so what did you notice?”
* Teacher will then play one other song at 25% volume level.
	+ “Can you still hear the music? What song am I playing? Are there any differences that you noticed from the last song? What about the first song that I played compared to the last one, did you notice anything different? What do you think made it easier to hear?”
* Teacher will then have students choose one item from the table of materials and have them take it back to their seats.
	+ “Alright students, now that you have something to make noise with I want you to experiment with it and see how you can make it produce sound.”
* Once students have had a chance to explore their item and see how they can make it make sound, the teacher will pair them with a partner.
	+ “Now I would like you and your partner to use your items, and stand different distances from each other to see if they can hear it. If they cannot hear you making the noise, see if you can adjust it to make it possible for your partner to hear it. If they can hear it, then try standing further away from each other.”
* Once students are finished, I will have them put their items back on the table up front and head back to their seats for a short discussion on their findings.
	+ “What did you notice when you got further and further apart from your partner? How did you adjust/change what you were doing, so that your partner could hear your sound? What did you find to be most challenging about this activity? What made it easier for you?”

**EXPLAIN** * After snack time, the teacher will have students return to their seats, sitting next to their partners that they created their device with.
	+ It is possible that while students are having snack time, the teacher can move the tables in the classroom to allow pairs to have their own space to revise and test
* Once they’ve all sat down and quieted down a bit, the teacher will start to ask students guiding questions like:
	+ “So today we talked about volume and what that means, can anyone tell me a bit more about what they think about volume?”
	+ I’ll be looking for comments like:
		- “If you play something louder it can travel harder!”
		- “When a song is loud it has more sound waves”
		- “When you play something soft it gets hard to hear”
	+ I’ll then explain to them further that “when a sound has a higher volume, it has more sound waves, which means it’s easier to hear it with your ears. But sometimes if a sound is too loud, it can be painful. Has there ever been a time where something or someone was so loud that it felt like it was hurting?”
	+ “When we use our devices today, I want you all to think about, what is too loud? I’m talking right now and you can hear me yes? Am I yelling? Am I shouting or screaming? No, I’m simply talking in an inside voice, using a normal volume. Sometimes, it helps when everything else has a low volume, and only one sound is playing, like my voice!
	+ I’m also standing a couple feet away right? There’s a distance from me and the tables you guys are sitting at. And sometimes, if a table is far away, they can’t even hear! Those are some ways that volume and distance can affect sound waves. All those little vibrations are traveling in the air and getting wider and wider from me. If I whisper like this, I bet some of you can’t even hear me right? \*whispers\* So I want you guys to think about how you can use a normal volume and a normal distance, to test your devices today. But first we’re going to do some brainstorming! How can we make these devices better at making sound travel? I would like one group to volunteer.”
* I will then choose a pair to focus on during a demonstration of a revision, most likely Mallory’s group.
	+ I will ask them questions such as:
	+ Can you two come up and explain what your device is? What were some things you noticed about your device that needed changing? What did you do? Can you explain to the class why? How did it help?
* This way, once students have seen an example of a revision in action, I’ll prompt them to do revisions of their own once again
* The last bit of time before the second round of testing begins will be spent having students revise and IU teachers floating around monitoring.

**ELABORATING/EXTENDING Understanding** **Group Testing and Discussion*** Teacher will have students line up against the wall and go down the line to show each other how the device works.
	+ “Alright, now I need everyone to stand with their partner at the back wall, and one at a time I am going to have you guys show everyone how your device works. You are not going to explain how it works during this demonstration, just take five seconds to talk into your device so that everyone can see what you did! We are going to start at this end!”
* After students are done showing their devices, students can put their devices on the table and sit back at the carpet for a small discussion
	+ “Now that we have seen everyone’s devices, I want you to put your device back at your seat and meet me at the carpet”
		- Teacher can ask questions like:
			* “How did you use sound to create your communication device?”
			* “How did vibrations help with your device?”
			* “How did volume (or being loud and quiet) help with your device? Did volume help your device? (If not then, why not?)
			* “Did anyone get to test their device around a corner?”
				+ “Did it work the first time?

“What is something that you had to revise to get it to work?”* + - * “How did the distance affect how well your device worked?”
			* “What is something that you had to revise today to get your device to work?
				+ “How did that help your device work the next time you tested it?”
			* “Is it okay to not get it right the first time when you make something?”
				+ (Teacher can say something about how this is how scientists and engineers work everyday, with getting things wrong and testing and retesting things)
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| **Assessment Evidence (\*This is the Evaluation Phase of the 5E approach)** |
| **Performance Task(s):** * Each group is sharing their design and device with the class. Their device should work at varying distances. If their device works, this shows their understanding of sound in general as well as vibrations, waves, and volume
 | **Other Evidence:*** Student responses
 |
| **Materials + Quantity:*** Students sound devices from last week
* Cups (2)
* String (roll) (or at least 3 yards)
* Tape (whole roll of scotch tape and masking tape)
* Glue Gun (ONLY TEACHERS USE)
* Paper (a lot)
* Cardboard Tubes (as much as possible)
* Rubber Bands (a handful)
* Straws (25)
* Cereal Boxes (As much as possible)
* Plastic Bottles (5)
* Drawing plan sheet
* Scissors (5) (adult because we will be cutting)
* Metal cans (10)
* Sticks (26)
* Plastic (not paper) cups (19)
* Speaker
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| **Required Accommodations/Modifications:*** **Gear Up:** If students are able to create and test a device that successfully makes a sound travel over a distance and around a corner, students will be tasked with coming up with revisions to their device with the goal of making a sound travel through a barrier (closed door/wall/beam or pole/etc.).
* **Gear Down:** If students are unable to successfully revise their device to complete the goal, students are encouraged to start over, or even join another group. Alternatively, they can choose to work with an IU teacher to come up with more revisions, or suggest alternate device ideas
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