POSSIBLE TEACHING OUTLINE FOR Sounds Like Fun: Seeing Animal Sounds

Lesson 1

- Complete abbreviated "what is technology" and ask who designs these technologies.
- *We are going to read about some engineers*- read or tell the story of Kwame.
- *What was Kwame's problem? How did he solve the problem? Was Kwame an engineer?*
- *Engineers need to know about science and math in order to do their jobs. Today we are going to review what we know about sound, so we can be sound engineers, or acoustical engineers.*
- List what students know about sound.
- Students explore and observe rubber band guitars and share observations with the class- make sure to address- *What is making the sound; What is the rubber band doing?*
- Complete tuning fork activities (entire lesson is in back of Jane Goodall Blueprint for Biography).
- Make a model of a sound wave using students to show how sound travels from the moving (vibrating) tuning fork, through the air, to the ear. Make sure the "ear" braces his/her feet further apart to prepare for the push.
- Add what students learned to "What we Know" chart, and correct any misconceptions.

Lesson 2

- Hold up an item to ask if it is technology and why- remind students that engineers design, create, or improve technologies but they don't actually build or fix students.
- Review Kwame's problem and the process he used to solve the problem- He asked questions about sound (elephants), brainstormed some ideas with the fu fu, planned a design, and sent the design to his cousin.
- *Today we are going to be sound engineers and solve a problem. We have these homemade guitars and they are too loud. We need to make guitars quieter. So what's the problem we are trying to solve?*
- Have students brainstorm some ideas and then tell students that they may NOT change the plastic tub, the rubber band, or how hard they pluck the rubber band… ask students to brainstorm some other ideas and lead students to the idea of using a material to quiet the guitar.
- Show students the materials they will be testing. Have students make observations about each material after interacting with it and add the observations to a t chart- materials/ properties. *The property of an object is a word that describes the object. What are some properties of the…* Have students decide if each material would be a good material to quiet the guitar and why.
- Test each material- felt, then foil, then clay. Reflect on what students discovered.
- *Today you were a sound engineer. What problem did you solve? How did you solve that problem? What did you learn about sound that helped you solve the problem? Tomorrow you are going to be a sound engineer again and solve another problem.*

Lesson 3

- Review technology- For example: *Is a car technology? Why? Would an engineer design a car?* (yes) *Would an engineer build a car?* (no) *Would an engineer improve a car design?* (yes) *Would an engineer fix a car?* (no)
- Review that Kwame was an engineer and what problem he solved as well as how he solved it.
- Remind students that they were engineers yesterday and solved a problem- what problem did they solve and how did they solve it?
- *Today you are going to be sound engineers again. Before I introduce the problem we need to review a few more ideas about sound. What do you remember about sound?*
- Talk through the representation of the elephant sound. You may have to demonstrate what you mean by "parts" by doing the claps and asking how many parts in that sound pattern. *How many parts do you see? Are the parts the same or different? How?* Make the sound using beeps.

- Go back to the fu fu- ask the students what sounds were made when mixing the fu fu (thump, slide). Use stars and arrows patterns to see if they can identify thump and slide without you telling students. Discuss how they knew- try to get students to make the connection that a long sound= slide and a short sound= thump.
- As a whole group brainstorm some other possible symbols for thump and possible symbols for slide and then have students make their own symbol for thump and symbol for slide.
- Once students have a symbol for each ask students to use their chosen symbols to complete a thump/slide pattern- for example thump, thump, slide, slide, thump, thump.
- You can end part 1 of Lesson 3 here or keep going. Suggestion: Take up the sheet to check for level of understanding on how to represent sound.
- If you do start part two on a separate day be sure to review technology- For example: Is a pencil technology? Why? Would an engineer design a pencil? (yes) Would an engineer build a pencil? (no) Would an engineer improve a pencil design? (yes) Would an engineer fix a pencil? (no)
- *Now that we have practiced reading sound representations we are ready for our second problem.* Introduce the speckled bubble bird problem- make it occur in Arkansas. Play the sound.
- Have students brainstorm a list of ideas for solving the problem- remembering the sound for many hours as they hike out of the woods. Explain the constraints after they brainstorm- can't catch it- that's illegal; can't record it- you forgot all equipment except paper and pencil; can say it over and over in your head because there are too many talkers in the group….) Eventually, hopefully someone will suggest drawing a picture of the sound.
- Play the sound and discuss what observations they can make. Ask how many parts. Draw the lines for each part, choose a symbol and talk through how each part is different. Once the representation is complete have the

students make the sounds using beeps. Model making an improvement such as coloring in the shapes or making them bigger. *Remember engineers are always improving their designs.*

- Have students work to come up with a different symbol and represent the sound using the new symbol on their paper.

Lesson 4

1. Review technology- For example: *Is a lunch box technology? Why? What would an engineer…?*
2. *Yesterday we were sound engineers again. What was our problem? How did we solve the problem? Was our solution successful?* Pull out yesterday's speckled bubble bird representation and see if students can use "beeps" to represent the sound accurately. Ask again if they solved the problem successfully- *How do you know?* (because they were able to make the sound correctly using the representation one day later)
3. *Since you were so successful solving the problem, we are going to test this design idea with other birds*.
4. Repeat the process you used with the speckled bubble bird with the blue jay- number of parts, same or different, what symbol could we use. After you make a group representation and model how you would improve your design, have students make their own representations.
5. Repeat the process with the cardinal. Play the blue jay sound to compare the two- *how are they different?* Have students close their eyes and move their hands with the sound.
6. Repeat the process with the Eastern wood pee wee. Compare this bird sound with the others (play the others to compare) and move the hand with the sound.
7. Repeat the process with the red-winged black bird.
8. *Did we solve our problem successfully? Can you remember the sound of the birds by looking at these representations? Let's test it and see.* Draw several on chart paper and have students decide what bird sound is represented.
9. Extension- improve designs by using other objects for representations (noodles, string, beads).
10. Cut out copies of the waveforms and have students identify the wave form that corresponds with the four bird calls they represented.