“SOUNDS ARE ALL AROUND US”

ALLISON BULLARD
TSL 518
SUMMER, 2013
Introduction
I want my students to know that sound waves travel through solids.

Directions:

I want my students to know that sound waves travel away from a vibrating object in all directions.

I want my students to know that sounds are vibrations.

6. Learning Goals

http://www.csonton.net/7ebdp/3/mrsc.htm

Six lessons for Grade 3 Science in March (Lessons 31-36) on Sound, accessed at:

E-mail: bcpi@bcpi@baltimoremre.org

1 Baltimore, MD 21211

711 West 40th St, Suite 3A

Baltimore Curriculum Project

5. Source of Lessons:

http://www.youtube.com/watch?v=FL5GcYVb9B

Transcript (Teacher-produced) of YouTube Video “Choreography” accessed at pp. 8-9


4. Source of Written Reading Materials:

3. Target Group: A content-based ESL class (all ESL: Primary purpose is language development)

2. Grade Level: 3rd Grade Science

1. Title: “Sounds are all around us”

Unit Introduction: “Sound are all around us”

Lesson 1

Allison Bueland

TSL 518, Verplancke
Lesson 1
## Language and Content Objectives, Lesson 1

<table>
<thead>
<tr>
<th>Content Objectives</th>
<th>Language Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) SW Identify and list sounds</td>
<td>1) In pairs, SW write poems identifying sounds they do and do not like.</td>
</tr>
<tr>
<td>2) SW Demonstrate understanding of the concept of onomatopoeia</td>
<td>2) As a class, students will generate and identify examples of onomatopia, and write and record a class poem.</td>
</tr>
<tr>
<td>3) SW Identify objects from sound in a container.</td>
<td>3) In small groups, students will predict the contents and label sealed containers of objects. Groups will orally share their predictions with the class.</td>
</tr>
</tbody>
</table>

* Throughout this lesson plan, content from the original lesson plan ([http://www.cstone.net/7Ebc3/3MrSci.htm](http://www.cstone.net/7Ebc3/3MrSci.htm)) will be in Times New Roman Font. Added/modified material will be in Verdana font.*
## Performance Indicators

<table>
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<th>1: Starting Pre-production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WRITING</strong></td>
<td>Write a poem identifying sounds</td>
<td>Students will write a 2-verse poem using the template on the board.</td>
<td>Students will write a 1-verse poem using the template on the board</td>
<td>Students will write a poem using a written template.</td>
<td>Students will write a cloze poem using words from a word bank and assistance from their partner.</td>
<td>Students will complete a poem template using pictures or words from a word bank and label them with assistance from their partner or the teacher.</td>
</tr>
<tr>
<td><strong>LISTENING</strong></td>
<td>Listen to a poem about onomatopoeia</td>
<td>Students will listen to a song and write words that imitate sounds on listening guide.</td>
<td>Students will listen to a song and fill in 9 words on a listening guide.</td>
<td>Students will listen to a song and fill in 5 words on a listening guide.</td>
<td>Students will listen to a song and will circle and underline words on a listening guide.</td>
<td>Students will listen to a song and will circle and underline words on a brief listening guide.</td>
</tr>
</tbody>
</table>
## Functional Language Chart

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expressions</th>
<th>Words</th>
<th>Grammar</th>
</tr>
</thead>
</table>
| Expressing preferences and contradictions | Writing a poem     | I ___1___ the sound of ___2_____.  
But I ___1___ the sound of ___2_____. | 1. Like/don’t like  
2. Rain, alarm clocks, school bell, cat meowing, reggaeton, thunder, car honking | Negation, Object nouns, Conjunction *but* |
| Predicting                              | Scientific experiment | We think that it ___3___  
___2________ | 3. sounds/sounded like | Past tense, regular verbs |
| Literary terms                          | Analyzing language  | This is an example of ___4________. | 4. Onomatopoeia | Literary term |
| Requesting facts about events           | Listening to sounds | What ___5___ that sound?  
___6___ you hear that | 5. Is, was  
6. Do, Did | Past tense, irregular verbs (to be, to do) |
### Key Vocabulary:
- sound
- to make a sound
- onomatopoeia
- imitate
- identify
- container

### Materials (incl. supplementary and adapted):
- Computer
  - with Youtube video “Onomatopoeia” cued:
    - [http://www.youtube.com/watch?v=f1b5kCvVBo8](http://www.youtube.com/watch?v=f1b5kCvVBo8)
  - with ability to play/record audio
- Board space and sentence strips to frame main ideas
- A plastic butter tub containing a handful of pennies
- For each group of five students:
  - A marker
  - 3 plastic butter tubs each containing a handful of everyday items.
    - One container might contain paper clips, another buttons, the third small pencil erasers.
    - Each container is sealed with tape and has a masking tape label on it.
  - Overhead projector with
    - transparencies and marker
    - Copy of What’s That Sound? Instructions (p. 17)
- Copies for each student of
  - Sound Poem Template / Worksheet (p. 10)
  - Onomatopoeia Listening guide (5 levels) (pp. 12-16)

### Time: 45 min

<table>
<thead>
<tr>
<th>Time</th>
<th>Activities</th>
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<tbody>
<tr>
<td>5 min</td>
<td><strong>Building background: Sounds are all around us</strong></td>
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<tr>
<td></td>
<td>Say, “I want you to listen and write down or draw a picture of what you hear. (cup a hand to your ear)” Play a tape recording of sounds commonly heard during the school day (5 noises: school bell, door slamming, car honking, dog barking, person sneezing).</td>
</tr>
<tr>
<td></td>
<td>Post the main idea, “Sounds are all around us” in a</td>
</tr>
</tbody>
</table>
designated spot on the board. Ask students and write on the projector, “What sounds did you hear?” underlining the word sound. Say, “I heard a dog barking, woof-woof”. Write the sentence frame “I heard...” on the board and ask students again, “What sounds did you hear? You can say, “I heard....” Provide appropriate wait time. Ask students to share the sounds and list them on the overhead projector.

Say, today, we are going to listen to sounds. Ask students, what is a sound? Say, a sound is something you hear (cup a hand to your ear). Things can make sounds (bang a mug on the desk, rattle pencils). People can make sounds – people can sing (la la la).

Say, today, We are going to identify sounds, we are going to say what they are.

**Presentation, Practice & Application:**

**Activity 1: Writing Sound Poems (in Pairs)**

Say, there are some sounds I like, and some sounds I do not like (dramatize with face of dislike/disgust). Share with the students a sound you like and a sound you do not like.

Say, now we are going to write sound poems about sounds we like and don’t like.

Model writing a sample poem using the template given to the students, for example

I like the sound of rain.
But I don’t like the sound of thunder.

Divide the students into pairs, pairing students of lower levels of language proficiency with partners to support them. Have each pair create a poem using the template below (on page 10):

I like the sound of _______________________________,
the sound of _______________________________,
and of _______________________________.
But I do not like the sound of _________________________.

Give students at levels 1-2 a word bank (page 11) to support writing the poem.
After some writing time, have a few students share their poems with the class.

**Activity 2: Onomatopoeia: A Class poem**

Ask the students to, with their voices, imitate the sounds they have talked about in their poems. For instance, *creak* for a squeaky door or *chirp* for a bird. Say, we call this onomatopoeia. Write the word *onomatopoeia* (AHN-oh-mot-oh-PEA-uh) on an overhead projector. Ask students to repeat, clapping out the syllables.

On a projector, show the Youtube video, Onomatopoeia. Give each student a listening guide (levels 1-5, pages 12-16) which will ask student to fill in, underline, or circle words.

Say, this word ONOMATOPOEIA means, words that imitate sounds. Ask students, what are some examples of onomatopoeia you heard in the video? Write words on overhead.

Ask the whole class to students to repeat these words, first saying the object, then saying the onomatopoeia with animation and exaggeration: ex: The cat MEOWs. The car BEEEPs.

Say, in the video, we heard English onomatopoeia words for animal sounds. What animal onomatopoeia did you hear?

Say, Different languages sometimes use different words -- different onomatopoeia -- for the same sound.

Say, “In English, a pig says “oink”. Ask, “what does a pig say in Spanish (or your language)? On the projector, write a chart comparing onomatopoeia noises in students’ languages.

### Possible responses:

<table>
<thead>
<tr>
<th>Animal</th>
<th>English</th>
<th>Spanish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pig</td>
<td>Oink</td>
<td>Oinc oinc</td>
</tr>
<tr>
<td>Horse</td>
<td>Neigh</td>
<td>jiiiiii</td>
</tr>
<tr>
<td>Dog</td>
<td>Woof</td>
<td>Guau guau</td>
</tr>
<tr>
<td>Cat</td>
<td>meow</td>
<td>miaou</td>
</tr>
</tbody>
</table>
Rooster | Cockadoodle-doo | Cucurucucú

Have the students create a noisy onomatopoeic poem: go around the room and have each child say an onomatopoeic word. They may think of new ones or use words from the video or the class list. If possible, record the poem and then play it back for the students to hear.

**Activity 3: Experiment: Sound ID**

Remind the students that when they listed sounds they heard at the beginning of the lesson, they identified what made those sounds. For instance, the honk they heard was a car horn or the slam was a classroom door closing.

Shake a container of pennies. Say, Listen! Do you think this is water? (no) Do you think it is cookies? (no) Do you think this is sand? (no) How can you tell? (by the sound it makes) Shake the container again and ask the students to tell you something about the contents of the container. Ask, is it solid or liquid? Students might identify the sound of metal jingling, identify the contents as solid and not liquid and even identify the contents as pennies or coins.

Show the students the contents of the container. Tell the students that they are going to divide into groups to identify sounds. Divide the class into heterogeneous groups of five students each. Distribute the containers to each group and tell the students that inside each sealed container are things we use every day.

Say, You cannot open the container or see the items. I want you to identify them using your ears (gesture to ear). Distribute the containers to each group. Tell the students, when they think they know what is inside a container, to write the name of the items on the masking tape label. Model writing “pennies” and labeling the container.

When groups have finished labeling the containers, have each one come up, show the labels to the class and then open the sealed containers to verify the contents.

Have an instructional conversation about the experience. Wonder aloud, how did you know what was in the container? Encourage groups to share their experiences and their process with the class.

<table>
<thead>
<tr>
<th>5 min</th>
<th><strong>Review and Assessment:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Play the onomatopoeia video again. Give each student a slip</td>
</tr>
</tbody>
</table>
of paper and ask them to draw or write an **onomatopoeia word, a word that imitates a sound**. Tell students, we are going to play a game **to identify sounds**. To line up, you will make the onomatopoeia sound you wrote on the exit slip. When someone guesses what the sound is, you may line up!
Sound Poem

We like the sound of ____________________________,
the sound of ____________________________,
and of ________________________________.
But we do not like the sound of ________________________________.
Word Bank: Sound Poem

a cat          a dog          money          a hammer

a baby crying  typing
Level 5 Listening Guide: Onomatopoeia Video

Listen to this song about *Onomatopoeia*. Write down **words that imitate sounds.**

Crash! Bash! Boom! Pow!  
What was that sound?  
_________________________________

Rumble! Growl! Slurp! Smack!  
Did you hear that?  
_________________________________

What’s that?  
Onomatopoeia  
_________________________________

Oink! Neigh! Woof! Meow!  
What was that sound?  
_________________________________

Slap! Flick! Swoosh! Whack!  
Did you hear that?  
_________________________________

What’s that?  
Onomatopoeia  
_________________________________

They’re **words that imitate sounds**  
Listen, they are all around  
_________________________________

Sniff! Cough! Achoo! Ow!  
What was that sound?  
_________________________________

Vroom! Honk! Screech! Crack!  
Did you hear that?  
_________________________________

What’s that?  
Onomatopoeia  
_________________________________
Level 4 Listening Guide: Onomatopoeia Video

Listen to this song about Onomatopoeia. Write in the missing words.

Crash! Bash! Boom! Pow!
  What was that ______?

Rumble! Growl! Slurp! ______!
  Did you hear that?

What’s that?
  Onomatopoeia

Oink! Neigh! Woof! _____!
  What was that sound?

______! Flick! Swoosh! Whack!
  Did you hear that?

What’s that?
  Onomatopoeia

They’re **words that ______ sounds**
  Listen, they are all ________

Sniff! Cough! Achoo! _____!
  What was that ________?

Vroom! Honk! Screech! Crack!
  Did you _____ that?

What’s that?
  ________________
Level 3 Listening Guide: Onomatopoeia Video

Listen to this song about Onomatopoeia. Write in the missing words.

Crash! Bash! Boom! Pow!
   What was that _______?

Rumble! Growl! Slurp! Smack!
   Did you hear that?

What’s that?
   Onomatopoeia

Oink! Neigh! Woof! ______!
   What was that sound?

______! Flick! Swoosh! Whack!
   Did you hear that?

What’s that?
   Onomatopoeia

They’re words that _______ sounds
   Listen, they are all around

Sniff! Cough! Achoo! Ow!
   What was that sound?

Vroom! Honk! Screech! Crack!
   Did you _____ that?

What’s that?
   Onomatopoeia
Listen to this song about *Onomatopoeia*.

Circle the word *sound*.

Underline the word *onomatopeia*.

What was that sound?
Did you hear that?

What’s that?
*Onomatopoeia*

What was that sound?
Did you hear that?

What’s that?
*Onomatopoeia*

They’re *words that imitate sounds*
Listen, they are all around

What was that sound?
Did you hear that?

What’s that?
*Onomatopoeia*
Level 1 Listening Guide: Onomatopoeia Video

Listen to this song about *Onomatopoeia*.

Circle the word *sound*.

Underline the word *onomatopeia*.

Crash! Bash! Boom! Pow!
What was that sound?

Rumble! Growl! Slurp! Smack!
Did you hear that?

What’s that?
Onomatopoeia
What is that sound?

“Talk with your group:

“I think it sounds like ______________.”

“I think it sounds like ___________ because ______________.”
Lesson 2
### Language and Content Objectives, Lesson 2*

<table>
<thead>
<tr>
<th>Content Objectives</th>
<th>Language Objectives</th>
</tr>
</thead>
</table>
| 1) SW Demonstrate that they understand that sounds are vibrations.                 | 1a) As a whole class, SW listen to and follow oral directions to experience sounds as vibration.  
1b) In pairs, SW discuss their observations of vibrations made by an object.       |
| 2) SW Build a sound wave detector.                                                 | 2a) In small groups, SW read and follow directions to build a sound wave detector.  
2b) In small groups, SW discuss and write a description of the results of the experiment and a hypothesis about how the sound detector works. |
| 3) SW Draw a diagram showing a way to prove that vibrations travel out from a sound maker in all directions. | 3) SW discuss orally with their groups how to conduct an experiment using multiple sound detectors. |

* Throughout this lesson plan, content from the original lesson plan (http://www.cstone.net/%7Ebcp/3/3MrSci.htm) will be in Times New Roman Font. Added/modified material will be in Verdana font.
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<tbody>
<tr>
<td><strong>WRITING</strong></td>
<td>Describe the results of an experiment</td>
<td>Students will write a paragraph to describe the results of an experiment.</td>
<td>Students will generate 3 sentences to describe the results of an experiment.</td>
<td>Students will write 3 sentences using sentence starters and words from a word bank to describe the results of an experiment.</td>
<td>Students will complete a cloze activity using words from a word bank to describe the results of an experiment.</td>
<td>Students will draw a picture and label it using a word bank to describe the results of an experiment.</td>
</tr>
<tr>
<td><strong>SPEAKING</strong></td>
<td>Design an experiment</td>
<td>Students will lead a small group discussion to design an experiment.</td>
<td>Students will take part in a small group discussion to design an experiment.</td>
<td>Students will take part in a small group discussion to design an experiment. They will work with the help of sentence starters and a word bank.</td>
<td>Students will take part in a small group discussion to design an experiment by generating 1-2 word phrases. They will work with the help of realia, a word bank and use of their L1, as needed</td>
<td>Students will take part in a small group discussion to design an experiment by pointing to and repeating words and phrases. They will work with the help of realia, a word bank and use of their L1, as needed.</td>
</tr>
<tr>
<td>Function</td>
<td>Situation</td>
<td>Expressions</td>
<td>Words</td>
<td>Grammar</td>
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<td></td>
</tr>
<tr>
<td>Describe</td>
<td>Sound wave detector</td>
<td>First we <em>1</em>__, then the salt <em><strong>2</strong></em></td>
<td>1. made a sound, banged on the carton</td>
<td>Sequence, verbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>experiment</td>
<td></td>
<td>2. vibrated, danced, shook, bounced, jumped up and down</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explain</td>
<td>Sound wave detector</td>
<td>The salt <strong>2</strong>__ because sound waves <strong>3</strong></td>
<td>3. travel, move the grains of salt</td>
<td>Causation, verbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>experiment</td>
<td></td>
<td></td>
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<tr>
<td>Discuss</td>
<td>Class pair discussion</td>
<td>The <strong><strong>4</strong></strong> <strong><strong>2</strong></strong></td>
<td>4. rubber band, tissue box</td>
<td>Nouns Verbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>Small group experiment</td>
<td>Let’s <strong><strong>5</strong></strong> the sound wave detector</td>
<td>5. Move, put</td>
<td>Suggestion Verbs</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>design</td>
<td>to the <strong><strong>6</strong></strong></td>
<td>6. front, back, left, right</td>
<td>of motion Prepositions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Key Vocabulary:**
- sound
- make a sound
- sound maker
- wave
- sound wave
- sound wave detector
- vibrate
- vibration
- travel
- vocal cords
- air particles

**Materials (incl. supplementary and adapted):**

For each pair of students:
- Rubber band stretched over an empty tissue box

A projector with
  - a clear bowl filled with water
  - a pebble
  - access to YouTube Video “Sound Wave Animation”
    [https://www.youtube.com/watch?v=aPswnDcteS4](https://www.youtube.com/watch?v=aPswnDcteS4)

Word wall with words illustrated by realia used in lesson or picture cues (p. 15-17)

**Sentence frames**

For each group of five students, a cafeteria tray with:
- Empty coffee can
- Piece of plastic wrap
- Rubber band
- 1/4 teaspoon salt
- Empty milk carton
- Ruler

Copies for each student of
  - modified experiment directions (p. 10)
  - sound detector worksheet (5 versions, p. 11-19)

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**Time: 60 min**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 min</td>
<td><strong>Motivation:</strong></td>
</tr>
</tbody>
</table>

Take an instrument or sound maker used in the last lesson, and bring it to the middle of the room. Make a sound, and ask students in each corner of the room if they heard it. Remind the students that in the last lesson they listened carefully and used their sense of hearing to identify different sounds. **Explain that today**
we are going to talk about how sound travels. Emphasize the word travels by making a sound and walking towards a student. When I make a sound here, how does (Student name) hear it?

Presentation, Practice & Application:

Activity 1: Pair Investigation and Class Discussion: What happens when we make a sound?

Ask students, “Now, what happens when we make a sound?”

Divide students into pairs, pairing beginning ELLs with students with more advanced language skills. Give each pair an empty tissue box with a rubber band. Introduce the vocabulary tissue box and rubber band, showing where they are on the word wall. Tell the students to make instruments by stretching the rubber band over the tissue box.

Demonstrate making a noise by plucking a rubber band stretched out over a tissue box.

Have one of each pair of students make the noise and the other observe, then switch roles. Each pair will discuss what they see.

Conduct a class discussion about what is sound using questioning prompts based on students’ English proficiency levels. Ask students: Can we see sound? (no) What do you think sound is? (Accept all answers.) Write student ideas and key words on the overhead.

Sample questions:
1) Point to the rubber band.
2) What moved?
3) What made a sound?
4) What did you see the rubber band do?
5) Why do you think the rubber band made a sound?

Tell students that sound is vibration. To facilitate comprehension for ELs, simplify the syntax, and pause at natural boundaries. Say, the rubber band vibrates (pause). The rubber band makes a sound. (pause) The rubber band makes a sound (pause) because it vibrates.
**Activity 2: Direct Instruction – What is Vibration?**

Demonstrate vibration with iPhone vibration. Write _vibrate_ on board and draw icon of phone with waves coming out of it.

Ask the students to put their fingers gently on their throats and hum (model humming). Tell the students that their sound makers--their vocal cords--are in their throats. Write _vocal cords_ on the board. Ask, “What do you feel?” Provide the sentence frame, “I feel my _vocal cords_ ___(move back and forth/shake/vibrate)__”. Tell them that when they talk or SHOUT or _sing_ or hummm, their vocal cords _move back and forth quickly_; they _vibrate_. Point to _vibrate_ icon presented earlier.

**Activity 3: What is a wave?**

Tell the students that like their vocal cords, the rubber band vibrates and make the _air_ around them vibrate or move, too. The movement creates a wave. Ask: What is a wave (write _wave_ on the board)? (Accept all answers)

Explain that when a rubber band vibrates, it makes _sound waves_ in the _air_. Say that the next video will show how sound travels in waves (use hand gestures) from a vibrating rubber band. Show YouTube video, “Sound Wave Animation” (https://www.youtube.com/watch?v=aPswnDc.teS4).

Say that when the rubber band vibrates it causes the _air particles_ next to it to move. Those particles move the particles next to them and so on creating a sound wave. Show video again and ask questions to assess understanding that that their vocal cords and the rubber band _vibrate_. Both make the air around them vibrate. The air vibrating creates waves of vibration called _sound waves_.

**Activity 4: Small Group Experiment: Making a Sound Detector**

Point out that sound waves travel away from a vibrating object in all directions. Demonstrate dropping a pebble into water using a clear bowl of water on projector. Ask the students to watch the waves it makes. Draw a dot on the board and concentric circles around it. Tell them that when an object vibrates, the sound waves move...
away from the object like waves in water.

Divide the students into heterogeneous groups of 4 or 5 and ask one student from each group to get a tray with the experiment materials and directions for the experiment (p.10).

Demonstrate making a completed sound wave detector by stretching plastic wrap over the top of a coffee can and stretching a rubber band around it. Point to vocabulary items on a word wall during demonstration, and use expression on sentence frame: First, then.

Tell each group to make a sound detector using the directions, with reference to the word wall (with pictures and realia) as needed, and complete the observation sheet. Give each student an observation worksheet (Levels 1-5, p. 10-18).

When each group has finished making and testing the sound wave detector, ask a Level 4/5 student in each group to lead a discussion about how to use all the sound detectors to prove that sound travels in all directions. Post the sentence frame *Let’s ______ the sound wave detector to the __6__.* to support participation by students with lower language proficiency. Circulate providing support as needed.

10 min Review and Assessment: *(Review objectives and vocabulary, assess learning)*

When the groups have finished, have a class discussion in which each group presents their plan. Allow one of the groups try the experiment for using all the sound wave detectors. Ask students to discuss what happened using key vocabulary on word wall. Ask, what does this experiment show?
Note to Classroom Teacher:

This lesson has been adapted to meet the needs of ELs in sheltered instruction.

The original lesson was presented almost entirely orally; the teacher wrote one word (vocal cords) on the board. The revised lesson plan presents more information in visual and written forms, which will reinforce new vocabulary and increase comprehension for students at all levels. The lesson plan also provides examples of appropriate question prompts for students at different levels of language proficiency.

In the original lesson, the teacher primarily lectures and does demonstrations at the front of the class to show that sound is movement. The revised lesson uses a pair investigation for the same material, which allows for experiential learning and promotes more language by students.

Twice, the original lesson plan directs the teacher in a whole class discussion to ask the students to *imagine* (dropping a pebble into a puddle and watching the ripples it makes) (that the dominos are tiny particles of air)”. The revised lesson adds visuals-- a demonstration with an actual bowl of water on the projector and a YouTube video with animated particles of air -- to allow ELs to better understand these key concepts.

Student materials are modified for students of different levels. Observation sheets Levels 3 and 1 include the support of a word bank and are adjusted so that students at each level can

Vocabulary development for ELs is supported by the addition of gestures, sentence frames, and a word bank. In addition, a classroom “Word Wall” will use realia and pictures to support the content objectives.
Sound Wave Detector 1: Experiment

You will need:

Empty coffee can
Piece of plastic wrap
Rubber band
1/4 teaspoon salt
Empty milk carton
Ruler

Directions:

1. Stretch plastic wrap across the top of the empty coffee can.

2. Secure the plastic wrap with a rubber band. Make sure the plastic wrap is stretched tight.

3. Sprinkle rice on the plastic wrap.

4. Stand close to the sound wave detector. Bang on the empty milk carton with a ruler to make sound vibrations.

5. Look at the grains of salt closely.
Sound Wave Detector 2: Observation

Write a paragraph to describe what happens to the grains of salt when you make a sound close to the sound wave detector.

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

Why do you think the salt grains act this way when you make noise near the detector?
______________________________________________________________________
______________________________________________________________________

Sound waves travel out from a sound maker like waves in water.

Discuss with your group: How could you show that sound waves travel out from a sound maker in all directions?

On the back of this page, draw how you could use all the sound wave detectors to show that. Use the symbol ○ for the sound wave detectors and ★ for the sound maker.
Sound Wave Detector 2: Observation

**Word Bank:**
Made a sound  
Vibrated  
Traveled

**Describe** what you did, and then what the salt did.
First we ________________________________________________,
then the salt ____________________________________________.

**Why** do you think the salt did that?
I think the salt __________________ because
______________________________________________________________________
______________________________________________________________________.


Sound waves travel out from a sound maker like waves in water.

**Discuss:** How can you show that sound waves travel out from a sound maker in all directions?

**Draw** how you could use all the sound wave detectors. Use the ○ for sound wave detectors and ★ for the sound maker.
Sound Wave Detector 2: Observation

Word Bank:
Made a sound
Vibrated
Traveled

Describe what you did, and then what the salt did.

First we ________________________________ ,

then the salt ________________________________ .

Why do you think the salt did that?

I think the salt ____________________ because sound waves from the sound maker ____________________ to the sound wave detector.
Sound waves travel out from a sound maker like waves in water.

**Discuss:** How can you show that sound waves travel out from a sound maker *in all directions*

**Draw** how you could use all the sound wave detectors. Use the ○ for sound wave detectors and ★ for the sound maker.
Sound Wave Detector 2: Observation

Word Bank:
Made a sound
Vibrated
Traveled

Describe what you did, and then what the salt did.

First we _____________________________.

then the salt _____________________________.

Why do you think the salt did that?

I think the salt ____________________ because sound waves from the sound maker ____________________ to the sound wave detector.
Sound waves travel out from a sound maker in all directions.

PROVE IT!

Design an experiment to prove that

<table>
<thead>
<tr>
<th>Directions</th>
<th>sound wave detector O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td>Right</td>
</tr>
<tr>
<td>Front</td>
<td>Back</td>
</tr>
</tbody>
</table>

Draw your group’s plan.
Sound Wave Detector 2: Observation

Word Bank:

| can | plastic wrap | rubber band | salt | milk carton | ruler |

Draw a picture of the experiment. Label it with words from the word bank.
Sound waves travel out from a sound maker in all directions.

PROVE IT!

Design an experiment to prove that

<table>
<thead>
<tr>
<th>Directions</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Left</td>
<td></td>
<td>Right</td>
</tr>
<tr>
<td>Front</td>
<td></td>
<td>Back</td>
</tr>
</tbody>
</table>

sound wave detector ○
sound maker ★

Draw your group’s plan.
Word Wall: Sound

Realia:

- coffee can
- plastic wrap
- rubber band
- salt
- milk carton
- ruler

Pictures:

- sound

- make a sound
wave

sound wave

vibrate
travel

vocal cords

air particles
Lesson 3
## Language and Content Objectives, Lesson 3*

<table>
<thead>
<tr>
<th>Content Objectives</th>
<th>Language Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) SW Demonstrate an understanding that sound waves move through solids.</td>
<td>1) In a class discussion, students will orally respond to questions about sound vibrations moving through matter.</td>
</tr>
<tr>
<td></td>
<td>2) Individually, students will read a passage about how sound travels through solids, liquid, and gas.</td>
</tr>
<tr>
<td>2) SW Construct and test a cup-and-string sound carrier (telephone).</td>
<td>2) In pairs, students will follow oral directions to construct and test a cup-and-string sound carrier.</td>
</tr>
<tr>
<td>3) SW Describe what the world might be like without telephones.</td>
<td>3) In a whole class instructional conversation, students will describe what the world might be like without telephones.</td>
</tr>
</tbody>
</table>

* Throughout this lesson plan, content from the original lesson plan (http://www.cstone.net/%7Ebcp/3/3MrSci.htm) will be in Times New Roman Font. Added/modified material will be in Verdana font.
<table>
<thead>
<tr>
<th>Domain</th>
<th>Topic</th>
<th>5: Bridging Transition Fluent</th>
<th>4: Expanding Inter. Fluent</th>
<th>3: Developing Speech Emergent</th>
<th>2: Emerging Early Production</th>
<th>1: Starting Pre-production</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>READING</strong></td>
<td>Sound moving through matter</td>
<td>Students will read a modified passage with short paragraphs and 11 key vocabulary words.</td>
<td>Students will read a modified passage with 8 key vocabulary words</td>
<td>Students will read a modified passage with 6 key vocabulary words</td>
<td>Students will read a modified passage with single words.</td>
<td></td>
</tr>
<tr>
<td><strong>SPEAKING</strong></td>
<td>What would the world be like without telephones?</td>
<td>Students will participate in a group discussion and record group ideas in writing about how they would feel or what would happen.</td>
<td>Students will participate in a group discussion about how they would feel or what would happen using full sentences.</td>
<td>Students will use the sentence frame on the board and 1 or two phrases to about how they would feel or what would happen.</td>
<td>In a small group discussion, students will participate using 1 and two word phrases about how they would feel or what would happen.</td>
<td>In a small group discussion, students will use gestures or actions to represent how they would feel or what would happen.</td>
</tr>
</tbody>
</table>
### Functional Language Chart

<table>
<thead>
<tr>
<th>Function</th>
<th>Situation</th>
<th>Expressions</th>
<th>Words</th>
<th>Grammar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrative</td>
<td>Science text</td>
<td>Sound travels <strong>1</strong>__ through <em><strong>2</strong></em>_.</td>
<td>1) slow, slower, slowest; fast, faster, fastest</td>
<td>Comparatives States of matter</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2) solid, liquid, gas</td>
<td></td>
</tr>
<tr>
<td>Espressing</td>
<td>Describing what the world would be like without telephones</td>
<td>I think it would be <em><strong>3</strong></em>_ because we could not <em><strong>4</strong></em>____</td>
<td>3) fun, hard, boring 4) order pizza, talk to our friends</td>
<td>Adjectives causation</td>
</tr>
</tbody>
</table>
Key Vocabulary:

- Sound waves
- Tuning fork
- Matter
- Solid
- Liquid
- Gas
- Cup-and-string sound carrier
- Molecules

Materials (incl. supplementary and adapted):

- Plastic ruler
- Tuning fork
- A Pin
- A projector with
  - clear glass bowl of water
  - transparencies & markers
- For each pair of students, a cafeteria tray with:
  - 2 paper cups
  - 4-6 ft. length of heavy thread or string
  - 2 paper clips
  - A pencil
- Copies for each student of
  - experiment directions (p. 8)
  - modified reading passage about how sound travels (Versions for Levels 4/5, 3, 2 and 1, p. 9-14)
- Sentence strips for small group discussion

Time: 60 min

<table>
<thead>
<tr>
<th>Time</th>
<th>Activities</th>
</tr>
</thead>
</table>
| 3 min | **Motivation:**
        | Review vocabulary from previous lesson: vibration, sound, make a sound, sound wave. |
| 10 min| **Presentation, Practice & Application:**       |
|       | **Activity 1: Class discussion and review: Air particles.** |
Remind the students that when an object vibrates, it moves molecules of air around it. Those air particles bump into the ones around them and create a wave. This is called a sound wave. Now, I am going to make a sound with a ruler. Place a plastic ruler flat on a desk with most of it overhanging the edge. Hold it down to the desk with one hand and, with the other hand, snap the ruler so it vibrates against the desk. Ask the students to look carefully at the ruler when you snap it to see it vibrate.

Conduct an instructional conversation. Write student ideas and key words on the overhead.

Sample questions:
1) Can you see the air vibrate? (No)
2) What is the ruler doing? (vibrating)
3) Where does the sound wave start?
4) What do you think happens to the particles of air around the ruler?
5) Do you think sound waves can travel through water the same way they can through air? Why?

Show the students the bowl of water. Ask, Do you think sound waves can travel through water? (Accept all answers.) Say, this is a tuning fork. Show the students the tuning fork and demonstrate how it makes a sound. Hit the tines of the tuning fork against the heel of your hand. Say, when you hit the tuning fork, it makes a sound. Circulate through the classroom and allow students to listen to the vibrations of the tuning fork. Ask students to describe the sound the tuning fork makes. Is it high or low? Loud or soft? Point out that the vibrations are moving through air. Say, I wonder what happens when vibrations move through water. What do you think? Strike the tuning fork and let the tines touch the surface of the water in the bowl. Ask: What do you see? (ripples, waves) Point out that in a liquid, they can see evidence of vibration waves, the ripples (use hand gesture).

Activity 2: Instructional Conversation: How does sound travel through liquid, sound, and air?

Conduct an instructional conversation. Ask students if they have ever heard sounds underwater. Perhaps they have put their ears underwater in the bathtub or dove underwater in a swimming pool. Ask them to describe what the sounds they heard underwater were like. Tell the students that just as air particles are set in motion by a vibrating object, liquid particles are, too. So sound waves do move through liquids. Sounds travel through liquids very fast -- about four times as fast as they do through air!
Say, now, I want you to be very, very quiet for a moment. Make no sounds at all!

Ask: Do you think sound waves can travel through a solid such as the wood of a desk? (Accept all answers.) Have two volunteers come to the front of the room and stand on either end of a desk or table. Ask: Have you ever heard people say, "It was so quiet you could hear a pin (hold up pin) drop?" Write the English idiom, "It was so quiet you could hear a pin drop." Elicit student ideas about what that idiom could mean. Show the students a pin and have one of the volunteers drop the pin on the desk. Ask the other volunteer if he or she heard the sound of the pin drop. Have that volunteer put his or her ear flat on the desk and have the other volunteer drop the pin again. Ask the listening volunteer: Was the sound of a pin dropping different? How did it sound when your ear was on the desk and you were hearing it through the wood? (The sound was louder or easier to hear through wood.)

**Activity 3: Reading Passage: Speeding sound**

Say, now we are going to read about how sound travels through different matter. Turn to your neighbor and talk for a moment about how you think sound travels differently through solid, liquid and gas.

Pass out modified reading passages (5 levels, pp. 9-14) with questions.

Ask students to read the passage silently, then turn back to their neighbor and talk about what you learned.

**Activity 4: Pair Experiment: Constructing a Cup and String Telephone**

Show the students a piece of string. Ask: Do you think sound waves can travel on string? (Accept all answers.) Post a diagram on the board (p. 8). Pass out copies to students with a word bank (p. 8) of how to construct a cup-and-string voice carrier. Give each pair of students a piece of thread, two paper cups and two paper clips to make and test their own voice carriers. When the students are finished, ask what they concluded from their tests: Can a piece of thread carry sound vibrations? (yes) Point out by using the diagram that talking into the paper cup made the bottom of the cup vibrate. Those vibrations caused the string attached to the bottom of the cup to vibrate. The vibrating string made the bottom of the
other cup vibrate so the partner heard what was being said. Ask: What might be another name for a cup-and-string voice carrier? (telephone) Point out that the telephone they made is a very simple one. Ask: What happened when the string was not pulled tight? (**show using gesture**) (Sound did not travel through the string.) Why do you think the string had to be tight for the telephone to work? (The string would not vibrate when it was loose.)

**Activity 5: Small groups: No Phones!**

Tell the students that more than 100 years ago there were no telephones. Ask the class, what the world would be like with no telephones. Would there be problems? Would there be good things? Provide the sentence frame on the board, “I think it would be __________ because ____________” and solicit an answer from students to model on the board. Divide the students into small groups, and choose a recorder for each group. Give each group several sentence strips and ask them to write their ideas. Circulate among the groups and encourage participation by all members.

**5 min**

**Review and Assessment:**

Ask the groups to orally share their ideas about what the world would be like with no phone.
How to Make a Cup and String Sound Carrier

You will need:

- 2 paper cups
- 4-6 ft. string
- 2 paper clips
- A pencil

Cup and String Sound Carriers:
Levels 4/5: Modified Reading Passage:

**Speeding Sound**

**Words to know**
- sound
- speed of sound
- matter
- solid
- liquid
- gas
- molecules
- fast/faster
- slow/slowest
- close together
- far apart
Three Types of Matter

<table>
<thead>
<tr>
<th>Gas</th>
<th>Liquid</th>
<th>Solid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecules are far apart</td>
<td>Molecules are closer together</td>
<td>Molecules are closest together</td>
</tr>
<tr>
<td>Examples: air</td>
<td>Examples: water, juice</td>
<td>Examples: wood, metal</td>
</tr>
</tbody>
</table>

Speed of sound Waves

A sound wave is the movement of molecules through matter.

The speed of sound is the speed that sound waves travel through water.

Through solids, sound waves travel fastest.
Through liquids, sound waves travel fast.
Through gases, sound waves travel slow.
Levels 3: Modified Reading Passage:

Speeding Sound

Words to know
- sound
- speed of sound
- matter
- solid
- liquid
- gas
- slow/slower
- fast/faster
Three Types of Matter

<table>
<thead>
<tr>
<th>Gas</th>
<th>Liquid</th>
<th>Solid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: air</td>
<td>Examples: water, juice</td>
<td>Examples: wood, metal</td>
</tr>
</tbody>
</table>

Speed of sound Waves

The **speed of sound** is the speed that sound waves travel through matter.

- Through **solids**, sound waves travel **fastest**.
- Through **liquids**, sound waves travel **fast**.
- Through **gases**, sound waves travel **slow**.
Levels 2: Modified Reading Passage:

Speeding Sound

Words to know
- sound
- speed of sound
- matter
- solid
- liquid
- gas
### Three Types of Matter

<table>
<thead>
<tr>
<th>Type</th>
<th>Example</th>
<th>Sound Travel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas</td>
<td>air</td>
<td>slow</td>
</tr>
<tr>
<td>Liquid</td>
<td>water, juice</td>
<td>faster</td>
</tr>
<tr>
<td>Solid</td>
<td>wood, metal</td>
<td>fastest</td>
</tr>
</tbody>
</table>

**Speed of sound Waves**

The *speed of sound* is the speed that sound waves travel through *gas, liquid or solid*.
Level 1: Modified Reading Passage:

The Amazing Facts About Sound

Speeding Sound

Three Types of Matter

<table>
<thead>
<tr>
<th>Matter</th>
<th>Sound Speed</th>
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</thead>
<tbody>
<tr>
<td>Gas</td>
<td>slow</td>
</tr>
<tr>
<td>Liquid</td>
<td>faster</td>
</tr>
<tr>
<td>Solid</td>
<td>fastest</td>
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</table>
Checklists
# Sheltered EL Strategies Checklist

<table>
<thead>
<tr>
<th>SHELTERED FEATURES</th>
<th>Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Conceptualize Lesson</strong></td>
<td></td>
</tr>
<tr>
<td>1. A. Build &amp; Activate Background knowledge</td>
<td>5</td>
</tr>
<tr>
<td>1. B. Develop Vocabulary</td>
<td>7</td>
</tr>
<tr>
<td>1. C. Use Visuals, Gestures, &amp; Realia</td>
<td>6</td>
</tr>
<tr>
<td>1. D. Create Opportunities to Negotiate Meaning</td>
<td>7</td>
</tr>
<tr>
<td><strong>2. Make Academic Text Comprehensible</strong></td>
<td></td>
</tr>
<tr>
<td>2.A. Use Graphic Organizers intentionally</td>
<td></td>
</tr>
<tr>
<td>2.B. Modify Written Text</td>
<td>12-16</td>
</tr>
<tr>
<td><strong>3. Make Talk Comprehensible</strong></td>
<td></td>
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<tr>
<td>3. A. Pace Teacher’s Speech</td>
<td>6</td>
</tr>
<tr>
<td>3. B. Use Listening Guides</td>
<td>12-16</td>
</tr>
<tr>
<td>3. C. Use Word Walls</td>
<td>7</td>
</tr>
<tr>
<td>3. D. Frame Main Ideas</td>
<td>5</td>
</tr>
<tr>
<td>3. E. Check for Understanding</td>
<td>7</td>
</tr>
<tr>
<td><strong>4. Change Traditional Classroom Talk</strong></td>
<td></td>
</tr>
<tr>
<td>4.A. Practice instructional Conversations</td>
<td>8</td>
</tr>
<tr>
<td>4.B. Ask Big Questions and Signal “Listening” in Responses</td>
<td>8</td>
</tr>
<tr>
<td><strong>5. Engage at Appropriate Language Proficiency Levels</strong></td>
<td></td>
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<tr>
<td>5.A Vary Question Techniques based on Students’ Proficiency Levels</td>
<td>5</td>
</tr>
<tr>
<td><strong>6. Give Students Voice</strong></td>
<td></td>
</tr>
<tr>
<td>6.A. Challenge Students to Produce Extended Academic Talk</td>
<td>8</td>
</tr>
<tr>
<td>6.B. Model Language for Oral and Written Production</td>
<td>6</td>
</tr>
<tr>
<td>6.C. Use Small Group/Pair Work to Elicit Student Talk; Students as Researchers</td>
<td>8</td>
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<tr>
<td>6.D. Respond to Students Voice — Writing and Error Correction</td>
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</table>
# Grammar and Functions Checklists

<table>
<thead>
<tr>
<th>Grammar</th>
<th>Lesson</th>
<th>1</th>
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<th>3</th>
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<tbody>
<tr>
<td>Negation</td>
<td></td>
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<td>Object nouns</td>
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<td>Conjunction “but”</td>
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<tr>
<td>Verbs, Past tense, regular</td>
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<tr>
<td>Literary term “onomatopoeia”</td>
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<tr>
<td>Verbs, past tense, irregular (to be, to do)</td>
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<td></td>
<td>X</td>
</tr>
<tr>
<td>Verbs, past tense, irregular (to make)</td>
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<tr>
<td>Causation</td>
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<tr>
<td>Verbs of motion</td>
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<td>Prepositions</td>
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<tr>
<td>Comparatives</td>
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<td>X</td>
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<tr>
<td>States of matter</td>
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<td>X</td>
</tr>
<tr>
<td>Adjectives</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Functions</th>
<th>Lesson</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Express preferences</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>Express contradictions</td>
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<td>X</td>
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<td></td>
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<tr>
<td>Analyze language</td>
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</tr>
<tr>
<td>Request facts about events</td>
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<tr>
<td>Explain</td>
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<tr>
<td>Discuss</td>
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<td>Suggest</td>
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<td>Express</td>
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<tr>
<td>Describe in a narrative</td>
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</table>
Original Lessons
Third Grade - Science - Overview - March

There are six lessons this month (Lessons 31-36) on sound. Students build a sound wave detector, construct and test a cup-and-string sound carrier, and create string, percussion and wind instruments for a class orchestra. They are given opportunities to work as a member of a group and independently.
At the end of these lessons is the third quarter assessment. It should be used after the six lessons for this month are completed.

Third Grade - Science - Lesson 31 - Sound
Sound identification test and homework assignment adapted from Sound and Music by Kay Davies and Wendy Oldfield

Objectives
Identify and list some sounds around them.
Create a poem describing sounds they like and those they do not like.
List some examples of onomatopoeia and create a class poem of onomatopoeic words.
Identify objects by the sounds they make when shaken in a container.

Materials
A tape recorder, if available
A 2 pint milk carton or plastic butter tub containing a handful of pennies
For each group of five students: A crayon or marker and three 2 pint milk cartons or plastic butter tubs each containing a handful of everyday items. One container might contain paper clips, another buttons, the third small pencil erasers. Each container is sealed with tape and has a masking tape label on it.

Suggested Books

Teacher Note
To save time, write the poem template on the board before the lesson.

Procedure
Ask the students to take out paper and pencil. Tell them you’d like to find out how well they listen. Have the students close their eyes, listen carefully to the sounds around them for a minute, then open their eyes and write down at least three sounds they have heard. Have the students share the sounds and list them on the board. Point out that by listening carefully, they identified these sounds even though, most of the time, they probably would not notice them because there are so many sounds around them.
Share with the students a sound you like and a sound you do not like. For example, you may like the sound of rain on an umbrella, but not like the sound of screeching brakes. Have the students create their own poems using the template below:

I like the sound of ________________________________,
the sound of ________________________________,
and of ________________________________.
But I do not like it when I hear the sound of ____________________________.

After some writing time, have a few students share their poems with the class. Ask the students to, with their voices, imitate the sounds they have talked about in their poems. For instance, *creak* for a squeaky door or *chirp* for a bird. Write the word *onomatopoeia* (AHN-oh-mot-oh-PEA-uh) on the board. Tell the students that *onomatopoeia* is the formation of a word that imitates a sound. Point out that *tweet* and *bang* are onomatopoeic words. Ask the students to help you list some other onomatopoeic words. The list might include *thump*, *ding-dong*, *beep*, *whoosh*, *crunch*, *cuckoo*, *atchoo*, *meow*, *cluck*, *bow-wow*, *growl* and *vroom*. Have the students create a noisy onomatopoeic poem: go around the room and have each child say an onomatopoeic word. They may think of new ones or use words from the list. If there is a tape recorder available, record the poem and then play it back for the students to hear.

Remind the students that when they listed sounds they heard at the beginning of the lesson, they identified what made those sounds. For instance, the honk they heard was a car horn or the slam was a classroom door closing. Shake a container of pennies. Ask: Do you think this container is full of feathers? (no) Of soup? (no) Of sand? (no) How can you tell? (by the sound it makes) Shake the container again and ask the students to tell you something about the contents of the container. They might identify the sound of metal jingling, identify the contents as solid and not liquid and even identify the contents as pennies or coins. Show the students the contents of the container.

Tell the students that they are going to divide into groups to participate in another sound identification test. Divide the class into groups of five students each. Distribute the containers to each group and tell the students that inside each sealed container are everyday items. The items in each container are all of one kind--no mixes. They cannot see the items, but will try to identify them using their ears. Distribute the containers to each group. Tell the students, when they think they know what is inside a container, to write the name of the items on the masking tape label. When groups have finished labeling the containers, have each one come up, show the labels to the class and then open the sealed containers to verify the contents. Keep a tally on the board of successful and unsuccessful identifications for each kind of item. Ask: Which item was hardest to identify by sound? Which was the easiest? Tell the students that next lesson they will learn about sound waves and make a sound wave detector.

**Possible Homework**
Have the students take a few minutes at home to listen carefully to the sounds around them and then make a list. Ask them to use their lists to make charts of the sounds they heard, classifying them under three headings: machines, living things, other sounds.

**Third Grade - Science - Lesson 32 - Sound**

**Objectives**
Build a sound wave detector.
Demonstrate that sounds are vibrations.
Draw a diagram showing a way to prove that vibrations travel out from a sound maker in all directions.

**Materials**
- Blindfold
- Two pieces of cardboard at least 8 2 inches by 11 inches
- Rubberband stretched over an empty tissue box
- A dozen dominoes
- A balloon
For each group of five students: coffee can, 1/4 teaspoon of salt, plastic wrap, rubber band, empty milk carton
or jug, pencil or ruler, sound detector worksheet (attached)

**Suggested Books**


**Teacher Note**

Be sure when blindfolding the volunteer that the blindfold does not cover his or her ears. The cardboard sound catchers can be cut into the shapes of large ears. A row of dominoes can be set up before the lesson begins to save time. Diagrams can be drawn on the back of the worksheet.

**Procedure**

Remind the students that last lesson they listened carefully and used their sense of hearing to identify different sounds. Ask: By listening carefully, can you also tell where a sound is coming from? (yes) Ask the students to help you test the sound locating skills of a volunteer. Tell them they must be very quiet so the volunteer will be able to focus on the location of a certain sound. Blindfold the volunteer and have him or her stand in the middle of the classroom. Tell the students that when you point to a student, that student should drum lightly on the desk or snap his or her fingers. Ask the volunteer to then point to the source of the sound. After five or six trials, tell the volunteer to listen carefully because you are going to have a student very softly whisper a name twice. You are going to ask the volunteer to point to the direction of the whisper and tell what name he or she heard. After a few of these trials, ask the volunteer: Is it more difficult to locate the whispers than the snaps and drumming? (yes) Tell the volunteer that you are going to give him or her a pair of sound catchers to help locate the whispers. Place a piece of cardboard behind each of the volunteers' ears and hold them in place. Try the whisper trial again. Ask the volunteer: Is it easier to hear and locate whispers with the sound catchers? (yes) Remove the volunteer's blindfold and show him or her the sound catchers. Have a few students come up, try out the sound catchers and report on their effectiveness. Ask: What do you think the sound catchers do? Why do you think they work? (They catch sounds and funnel them into our ears.)

Ask: Can we see sound? (no) What do you think sound is? (Accept all answers.) Tell the students that a sound is movement. Ask the students to put their fingers gently on their throats and hum a tune. Ask: Can you feel something quivering or vibrating in there? Tell the students that their sound makers--their vocal cords--are in their throats. Write *vocal cords* on the board. Tell them that when they talk or shout or sing or hum, their vocal cords move back and forth quickly; they vibrate. Stretch a rubber band over a tissue box and have students pluck the rubber band. Ask: What is the rubber band doing? (It is vibrating and making a noise.) Tell the students that like the rubber band, their vocal cords vibrate and make the air around them vibrate or move, too. The movement creates a wave--a sound wave--that travels to our ears so we hear sound.

Show the students the row of dominoes. Ask: If I push on one domino and make it fall down, what will happen to the next domino and the next and the next? (They will be pushed over, too.) Demonstrate by pushing on the first domino in the row. Ask the students to imagine that the dominoes are tiny particles of air. When the vocal cords vibrate they cause the air particles next to them to move. Those particles move the particles next to them and so on creating a sound wave. Set a few dominoes up and demonstrate again how movement at one end creates a wave.

Blow up a balloon and stretch the neck of the balloon as the air escapes to produce a sound. Ask: What do you think is happening to the rubber in the neck of the balloon as the air rushes out? (It is vibrating and making noise.) Point out that their vocal cords, the rubber band and the neck of the balloon all vibrate. They
make the air around them vibrate creating waves of vibration called sound waves. Point out that sound waves travel away from a vibrating object in all directions. Ask the students to imagine dropping a pebble into a puddle and watching the ripples it makes. Draw a dot on the board and concentric circles around it. Tell them that when an object vibrates, the sound waves move away from the object like ripples in a puddle. Tell them that one way to prove this is with a sound wave detector. Divide the class into groups of five students each and distribute worksheets and materials for making a sound wave detector. When the groups have finished, allow one of the groups to arrange the sound detectors according to their diagram and try to prove that vibrations (or sound waves) move out in all directions from a vibrating object.

**How To Build A Sound Wave Detector**

**Materials:**
- Empty coffee can
- Piece of plastic wrap
- Rubber band
- 1/4 teaspoon salt
- Empty carton or jug
- Pencil or ruler

**Directions:**
1. Stretch plastic wrap across the top of the empty coffee can.
2. Secure the plastic wrap with a rubber band. Make sure the plastic wrap is stretched tight.
3. Sprinkle salt on the plastic wrap.
4. Stand close to the sound wave detector. Bang on the empty carton or jug a few times with a pencil or ruler to make sound vibrations.
5. Watch the grains of salt closely.

Describe what happens to the grains of salt when you make noise close to the sound wave detector.

__________________________________________________________________
__________________________________________________________________

**Why do you think the salt grains act this way when you make noise near the detector?**

__________________________________________________________________
__________________________________________________________________

Remember that sound waves are waves of vibration that travel out from a sound maker in all directions like ripples in a puddle. If you had as many sound wave detectors as you wanted, how could you prove this? On the back of this page, draw a diagram of what you would do.

**Third Grade - Science - Lesson 33 - Sound**

**Objectives**
Demonstrate that sound waves move through solids.
Construct and test a cup-and-string sound carrier (telephone).
Describe what the world might be like without telephones.
Materials
Plastic ruler
Tuning fork and clear glass bowl of water
A pin
For each pair of students: two paper cups, 4 to 6-ft length of heavy thread or string, two paper clips, a pencil

Suggested Books
Gregoire, Tanya. Museum of Science Activities for Kids. Holbrook, MA: Adams Media, 1996. Contains a well-written description of a call to the pizza shop and how sound waves travels from the vibrations of vocal cords to telephone receiver where sound waves are changed into electrical signals that travel down a phone wire and to the other phone where they enter the ear piece and are translated back into sound waves and heard by the pizza man. In addition to instructions for making a string telephone, this book contains a section on other things to try such as experimenting with a four-way telephone and with different types of string and containers.

Teacher Note
To save class time, you may want to draw the cup-and-string sound carrier diagram on the board before the lesson. Tell the students that a pencil point is a good way to make a small hole in the bottom of the cup for the string. If they tie a paper clip to the end of the string, it will not slip out of the hole.

Procedure
Remind the students about the domino demonstration in the last lesson. Ask them to describe what happened when you pushed over the first domino. Remind the students that when an object vibrates, it moves air particles around it. Those air particles bump into the ones around them and, just like the dominoes, a wave is created—a sound wave. Place a plastic ruler flat on a desk with most of it overhanging the edge. Hold it down to the desk with one hand and, with the other hand, snap the ruler so it vibrates against the desk. Ask the students to look carefully at the ruler when you snap it to see it vibrate. Ask: What do you think happens to the tiny particles of air around the ruler when I snap it? (The particles of air around it vibrate and bump into other particles creating a sound wave.) Ask: Can you see the air around the ruler vibrate? Snap the ruler and have the students observe that the vibrating air is invisible.
Show the students the bowl of water. Ask: Do you think sound waves can travel through water the same way they travel through air? (Accept all answers.) Show the students the tuning fork and demonstrate how it makes a sound. Hit the tines of the tuning fork against the heel of your hand. Circulate through the classroom and allow students to listen to the vibrations of the tuning fork. Ask students to describe the sound the tuning fork makes. Point out that the vibrations are moving through air. Strike the tuning fork and let the tines touch the surface of the water in the bowl. Ask: What do you see? (ripples) Point out that in a liquid, they can see evidence of vibration waves, the ripples. Ask students if they have ever heard sounds underwater. Perhaps they have put their ears underwater in the bathtub or dove underwater in a swimming pool. Ask them to describe the quality of sounds heard underwater. Tell the students that just as air particles are set in motion by a vibrating object, liquid particles are, too. So sound waves do move through liquids. Sounds travel through liquids about four times as fast as they do through air.
Ask: Do you think sound waves can travel through a solid such as the wood of a desk? (Accept all answers.) Have two volunteers come to the front of the room and stand on either end of a desk or table. Ask: Have you ever heard people say, "It was so quiet you could hear a pin drop?" Show the students a pin and have one of the volunteers drop the pin on the desk. Ask the other volunteer if he or she heard the sound of the pin drop.
Have that volunteer put his or her ear flat on the desk and have the other volunteer drop the pin again. Ask the listening volunteer: Was the sound of a pin dropping different when your ear was on the desk and you were hearing it through the wood? (The sound was louder or easier to hear through wood.) Point out that in solids, particles are packed closer together than they are in liquids or gases such as air. When there are vibrations, even ones as small as from a pin dropping, particles that are more crowded together bump into each other more than they do in liquids or air. So sound vibrations actually travel better through many solids. They travel best through metals.

Say: Here is a tricky question. Native Americans who hunted buffalo on the Great Plains were sometimes seen putting their ears to the ground. Knowing what you do about how sound travels through solids, what do you think they were doing? (listening for the sounds of buffalo) Point out that the ground carried the vibrations from the hooves of the buffalo herd to the hunters farther than the air could carry them.

Show the students a piece of thread. Ask: Do you think a piece of thread or string can carry sound vibrations? (Accept all answers.) Draw a picture on the board of how to construct a cup-and-string voice carrier. Be sure to show in the diagram that the string should be taut. Give each pair of students a piece of thread, two paper cups and two paper clips to make and test their own voice carriers. When the students are finished, ask what they concluded from their tests: Can a piece of thread carry sound vibrations? (yes) Point out by using the diagram that talking into the paper cup made the bottom of the cup vibrate. Those vibrations caused the string attached to the bottom of the cup to vibrate. The vibrating string made the bottom of the other cup vibrate so the partner heard what was being said.

Ask: What might be another name for a cup-and-string voice carrier? (telephone) Point out that the telephone they made is a very simple one. Ask: What happened when the string was not pulled tight? (Sound did not travel through the string.) Why do you think the string had to be tight for the telephone to work? (The string would not vibrate when it was loose.)

Tell the students that more than 100 years ago there were no telephones. Ask: What would the world be like if we had no telephones? (Accept all answers and list them on the board.) Students might point out that without telephones, they could not keep in touch with relatives and friends outside the neighborhood. They could not order pizza. People in offices and businesses would have to write letters to communicate with other business people. It would take much more time for newspapers and news shows to find out what is happening in other parts of the world. People couldn't call a taxi or the doctor. There wouldn't be call in radio shows.

Tell the students that thanks to a man named Alexander Graham Bell who invented the telephone, today people can talk to friends living on the other side of the world or right down the street. Tell them that next lesson they will hear more about Alexander Graham Bell and his invention. They will also find out the first words said over a telephone.

### Third Grade - Science - Lesson 34 - Sound

**Objectives**

- Describe why there is no sound in space.
- Classify some sounds according to their volume.
- Arrange a series of water-filled glasses according to their pitches and indentify which glass is vibrating the fastest.

**Materials**

- Masking tape, six cards or labels describing sounds of various volumes (see Teacher Note)
- Four identical clear drinking glasses filled to different levels with water, a spoon
- Picture of Alexander Graham Bell from Suggested Books

**Suggested Books**

THE AMAZING FACTS ABOUT

SOUND

My Science Library
The Amazing Facts About Sound

by Buffy Silverman

Science Content Editor:
Shirley Duke

Rourke Educational Media
rourkeeducationalmedia.com

Teacher Notes available at rem4teachers.com
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What is Sound?

Listen to the sounds you hear while riding your bicycle to the park. Your bicycle chain clinks as it turns. Cars honk and tires screech on the street. In the park, birds sing and chipmunks chirp. The wind blows and leaves rustle. A friend shouts your name. Your brakes squeak as you squeeze them to stop. Your bicycle lock clicks in place. Every day you are surrounded by sounds.

We cannot see sound. But sounds impact us every day. We learn about our surroundings by listening to sounds.
Sound is a form of **energy**. Pluck a guitar string and it vibrates, or moves back and forth. The **vibrations** form **sound waves**. Sound waves move through air, water, and solid material. As they travel, they collide with microscopic particles. Sound waves make these particles, called **molecules**, vibrate.

*Knock on a door and molecules in the door vibrate. The moving molecules collide with air particles, sending sound waves through the air.*
Sound waves in the air are collected by your outer ear. They travel to the eardrum and make it vibrate. Then, vibrations pass through bones in the middle ear to the inner ear. They bend tiny hairs in the inner ear, causing nerves to fire that send messages to the brain. Your brain hears sound.
Speeding Sound

Sound can only travel through material, called matter. Solids, liquids, and gases like air are all made of matter. The speed of sound is the speed that sound waves travel through matter. Sound travels faster through a solid than a liquid, and faster through a liquid than a gas. Molecules in a solid are packed together so vibrations move rapidly from molecule to molecule. Molecules in a liquid are farther apart. Molecules in a gas are farthest apart so vibrations travel slowest.

Amazing Sound Fact
The sound of stomping elephant feet travels many times faster through the ground than through the air. Elephants detect these vibrations with their sensitive trunks and feet. They feel vibrations that are two miles (3.22 kilometers) away.

Sea lions hear better under water than on land, because sound waves travel faster through water than air.