

Spoon Gongs: A Guided Inquiry Experience for Elementary Learners.

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As a pre-service teacher, my experience of education in Ontario is vastly different to what I experienced during my own education in rural England in the early 2000s – what a relief. Long gone are the traditional days of an educator preaching facts to their students from the front of a classroom for the singular purpose of achieving a passing test score.

The research-based, pedagogical approach to Science and Technology of the Ontario Ministry of Education (Ontario of Ministry of Education, 2007) is shifting this traditional approach toward co-created and inquiry-based learning experiences that are engaging, accessible and intentional to develop essential skills to prepare students of today for the needs of the future. We, as educators, cannot claim to know the demands of the societies we prepare our students for, but it is imperative we provide opportunities for our students to develop twenty-first century skills like collaboration, creativity, communication, and critical thinking. The science classroom is a natural environment to develop these skills through genuine inquiry-based teaching that moves beyond subject knowledge and toward curiosity and problem-solving. The science classroom can be home to the “wow moments” that students remember, which bridge the gap between learning and living and connect students to the world around them.

Inspiration

This process begins when educators select learning experience that relinquish some of their control and allow their learners to guide the inquiry in their classroom. This article focuses on one such learning experience designed using the Smarter Science (2014) framework and the 5E instructional model for my Science and Technology course at Wilfrid Laurier University.

This hands-on activity is based on similar activities found online by Penshurst School (2022), Science World (2022) and Team Cartwright (2020), amongst others. I took aspects from each

source to create a collaborative activity that would require my students to be led by their curiosity and ask questions that would lead to their collaborative inquiry.

Curriculum Connections

Within the Ontario Science Curriculum, this activity was designed in the Grade 4 Understanding Matter & Energy Strand, focusing on the Fundamental Concept of Energy and the topic Light & Sound. The grade 4 specific expectations that shaped this learning experience are:

- **2.3:** investigate the basic properties of sound (e.g., conduct experiments to show that sound travels, that sound can be absorbed or reflected, that sound can be modified [pitch, volume], that there is a relationship between vibrations and sound);
- **3.4:** describe properties of sound, including the following: sound travels; sound can be absorbed or reflected and can be modified (e.g., pitch, loudness); and,
- **3.5:** explain how vibrations cause sound.

Materials

Each student requires a piece of string/yarn approximately 1metre long (can vary depending on height of students) and a metal spoon. Each student in the group should have a different sized spoon to allow for comparison, discussion and problem-solving amongst group members.

Instructions

Prior to beginning, the teacher should define classroom management expectations to maintain safety and guide student inquiry.

- Divide the class into heterogenous groups, maximum 5 students per group, and hand out spoons, one per student and ask them “*What do you notice about the sound?*”. After

students have had time to make observations, by hitting the spoon on their desks, ask them to share their observations popcorn style.

- After 5 minutes, hand out the string, then ask students to tie it to the handle of their spoon. Use a pre-made example to show students. Ask students to write down a hypothesis to the prompt “*What difference will the length of string make to the sound?*”.
- Have students then wrap the ends of the string around their index fingers to make a coil and have students place their fingers to their ears (not into) and hit the spoon. Ask the prompt: “*What do you notice about the sound now?*”.
- Finally, as a group, discuss how and why the sound has changed. Use the science concept explanation to guide the conversation and introduce some of the key science terminology from the curriculum: *absorbed, reflected, vibrations, pitch, and loudness*.

Differentiation

- Students can watch a YouTube video that visually shows the experiment and has closed captioning enabled. As an extension, students can experiment using other materials around the classroom to see how this affects the sound they hear.

Safety, Clean Up & Environmental Considerations.

- All students to wear safety goggles as a precaution.
- Students should not put their fingers into their ears, rather place their index fingers against their ears.
- All spoons brought into the classroom will be thoroughly cleaned before being brought into the classroom.

- Once the activity is complete, the string should be removed from the spoons by untying the knots. String can then be reused for this experiment, or other purposes, in the future.

Scientific Connections

An object creates a sound when it vibrates. Sounds travel differently through each form of matter because the molecules in solids, liquids and gases are arranged differently. Molecules in a solid are much more tightly packed than in air and the vibrations are passed faster from one molecule to the next. Sound waves travel faster through the string and are, therefore, louder, than in air. Additionally, some vibrations are reflected back toward the spoon and then back to our ear before being absorbed, causing reverberations.

Smarter Science Framework

This learning experience connects to the Smarter Science Framework as follows:

Engage: Initiate & Plan

- Observing: students will need to make direct observations using their 5 senses.
- Hypothesizing: using their prior knowledge and scientific curiosity, students will create “if... then... because” statements, with teacher prompting as required.

Explore: Perform & Record

- Constructing: students will construct their spoon gongs with two components.
- Experimenting: once they have made their spoon gong, they will test their hypothesis.

Explain: Analyze & Interpret

- Analyzing: looking for implications of adding string or different sized spoons.

- Evaluating: how can they change their process to get the best results.

Extend: Communicate

- Discussing: students working in groups will engage in oral communication about the activity.

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